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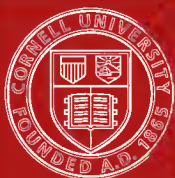


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THE FOOD INSPECTOR'S
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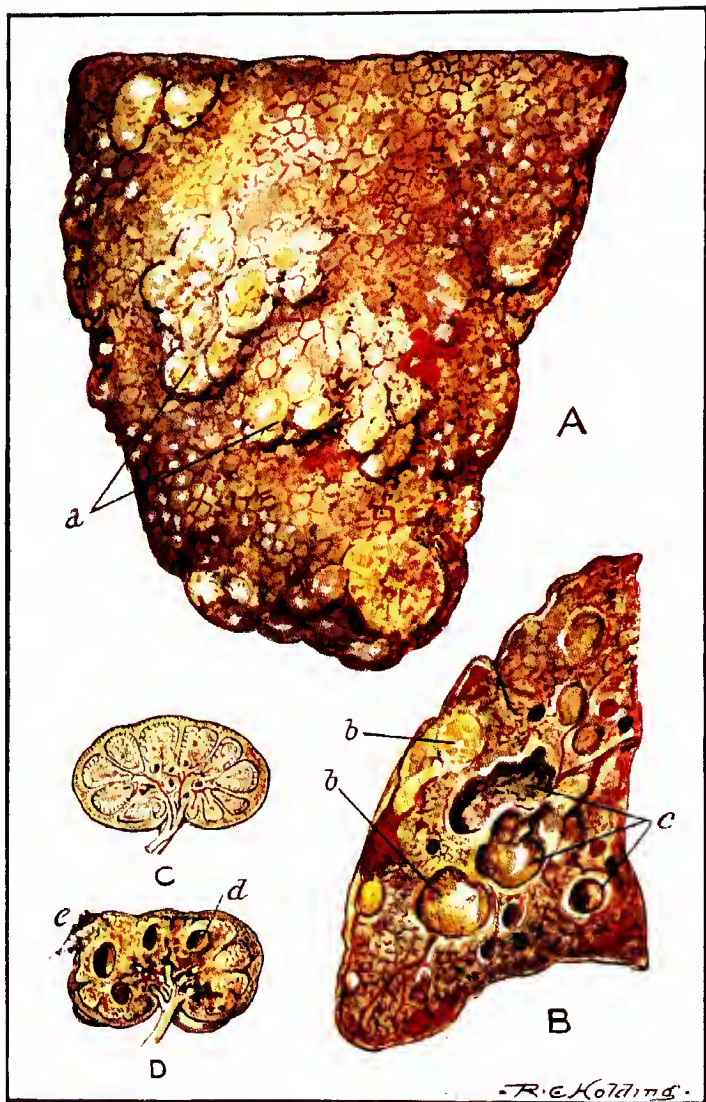
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TUBERCULOSIS IN CATTLE.

External surface (A) of portion of Cow's lung deposits (a) on surface, and portion of lung in section (B) showing deposits (bb) and cavities (c). Healthy gland in section (C) and similar gland in tuberculous condition (D) showing rupture of capsule (e) cavities filled with deposit (d).

THE FOOD INSPECTOR'S HANDBOOK

A PRACTICAL GUIDE FOR MEDICAL OFFICERS OF
HEALTH, MEAT INSPECTORS, ARMY OFFICERS,
STUDENTS, AND OTHERS

BY

FRANCIS VACHER

LATE MEDICAL OFFICER OF HEALTH FOR CHESHIRE
VICE-PRESIDENT OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH

SIXTH EDITION

Thoroughly Revised and greatly Enlarged.

*The Illustrations have been much increased in number:
among those from original specimens are coloured drawings of tuberculous
ribs of beef, and of tuberculosis in a bovine lung and gland.*



LONDON

THE SANITARY PUBLISHING CO., LTD.

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1913

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PREFACE TO FIRST EDITION

A PAPER entitled "The Physical Appearances of Sound and Unsound Food," which appeared in the *Sanitary Record* in two parts, published respectively on October 15th and November 16th, 1885, was so favourably received at the time by Medical Officers of Health and Sanitary Inspectors that it was reprinted as a handbook for the pocket. In 1890, as there was still a demand for it, it was carefully revised and re-issued, and in 1891 it was again reprinted. As the little book was still being called for, and the author received many applications for further information upon the same subject, "The Food Inspector's Handbook" was written and appeared in the *Sanitary Record*, chapter by chapter, during the present year. This is now revised and presented to the public in a complete form. It is designed to take the place of the previous little book, and includes all therein stated which the author thinks desirable to retain. How much has been added, those familiar with "The Physical Appearances of Sound and Unsound Food" will not need to be told. The introductory chapter, and the chapter on Statutory Powers, are new; the chapters on foods not mentioned in the Public Health Act have been added, while the important foods coming within the description of poultry, game, fish, fruit, and vegetables, to which were devoted three pages only, now occupy as many chapters.

The one wish of the author is that the work in its present form may prove thoroughly useful. His long experience as a Medical Officer of Health and Food Analyst has made him well acquainted with the topics treated of, and he is assured that only those who have had practical experience can write effectively on food inspection.

The author will be happy to give particulars or authorities in regard to any matters dealt with, and will be grateful to correspondents drawing attention to any inaccurate statement or literal error.

The illustrations, most of which were drawn by the author, have not printed as well as he expected, doubtless through his imperfect knowledge of all the requirements of the process of reproduction. However, it is hoped that they are sufficiently clear in every case to show the form intended, and that is really all that is needed.

BIRKENHEAD,

October 1892.

PREFACE TO SECOND EDITION

SOME evidence that a Food Inspector's Handbook was wanted, and that the author's attempt to supply the want has not been wholly unsuccessful, is furnished by the fact that a Second Edition is called for eighteen months after the issue of the first.

The work has been carefully read through, and revised, wherever revision appeared necessary, but the arrangement of subjects remains unchanged. Three or four articles have been added, many passages have been altered, and a few struck out ; while the number of illustrations has been increased from twenty to forty-two.

The author has only to add that he is always pleased to hear from Inspectors on matters treated of in the Handbook, and to reply to written inquiries.

BIRKENHEAD,

April 1894.

PREFACE TO THIRD EDITION

It was thought that the Second Edition of this book would not require revising for some years, and it was stereotyped to facilitate the printing of a large number of copies. However, as the Handbook was out of print early in the present year, and certain official publications (in particular, the Local Government Board Instructions to Meat Inspectors with regard to Tuberculosis in Animals intended for Food, and the Dairies, Cowsheds, and Milkshops Order of 1899) had made some additions necessary, the work has been read through and brought up to date. The illustrations have been increased from forty-two to fifty-eight.

The author has no doubt that those using the book will find the Third Edition an improvement on previous Editions. His aim has been to make this pocket volume a sufficient and trustworthy guide to those engaged in Food Inspection.

BIRKENHEAD,

September 1900.

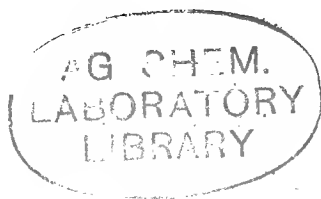
PREFACE TO FOURTH EDITION

THIS book has been carefully read through and brought up to date, and another chapter has been added on Statutory Powers.

The alterations effected in preparing the Fourth Edition have increased the size of the book from 188 pages to 223 pages, but it is still only a pocket volume. The author trusts that the Handbook in its present form will continue to be a sufficient and trustworthy guide to Food Inspectors.

BIRKENHEAD,

March 1905.



PREFACE TO FIFTH EDITION

DURING the last year or two a very much larger share of attention has been given to the systematic inspection of meat. The number of those who devote their whole time to meat-inspecting is yearly increasing. The need of efficient training for such men is being recognised, and more or less ample provision therefore is being made, especially in some of the larger towns. Under these circumstances "The Food Inspector's Handbook" has been read and revised with exceptional care, so that the new Edition shall prove complete, reliable, and thoroughly up to date.

Under the heading "Statutory Powers," Adulteration of Food, is a full reference to the Butter and Margarine Act, 1907, the Public Health (Regulation as to Food) Act, 1907, and recent Regulations of the Local Government Board on "Unsound Food and Foreign Meat."

In the chapter referring to Diseases which may depreciate the quality of the meat, render portions of the carcase unfit for human food, or, in the later stages, unfit the whole carcase for human food, will be found descriptions of many diseases not previously referred to.

As regards the illustrations, alterations of great significance have been made. Nine of the illustrations in the Fourth Edition have been cancelled, and replaced by others, more exact and fuller in detail. It will also be noticed that many of the diseases not previously illustrated, and all the

diseases not previously referred to, have been made the subject of careful drawings, and that a coloured drawing of Tuberculosis in Cattle has been introduced as a frontispiece. In all twenty-seven new drawings have been specially prepared for this Edition. The artist is Mr R. E. Holding, a gentleman who has already had much experience in delineating pathological conditions. With very few exceptions, his drawings have been from fresh specimens obtained for the purpose.

BIRKENHEAD,

September 1908.

PREFACE TO SIXTH EDITION

EARLY in the year 1912 the Fifth Edition of "The Food Inspector's Handbook" was nearly exhausted, and shortly after this steps were taken to revise the text and bring it up to date. A few alterations of more or less importance were made, and much additional matter was introduced.

As the Fifth Edition was published in the beginning of 1909, and no Public Health Acts have been passed since 1907, the portion of the book dealing with Statutory Powers, Regulations, etc., needed little amendment. However, an abstract of the Public Health (Foreign Meat) Amending Regulations, 1909, has been inserted.

In the chapter on Animals, Carcases, and Butchers' Meat, a short paragraph has been inserted, furnishing the approximate weight of certain organs of animals. At this part of the book a new chapter has been found a place, describing and illustrating the mode of cutting up beef, mutton, veal, lamb, pork, and bacon.

As regards diseases of animals, the Inspector will be assisted by the coloured reproduction of a drawing by Mr Holding, showing the appearance of a portion of ribs of beef from a tuberculous animal, contrasted with a similar portion of ribs of beef from a healthy animal. Additional illustrations are also given of certain diseases of swine.

To the chapter on Fish articles have been added, dealing respectively with coal-fish, monk-fish, grey mullet, and red mullet, while the article on salmon has been slightly improved. The signs of decomposition in fish have been more explicitly stated. It may be mentioned also that some

needed information has been given as to immature or unseasonable lobsters and crabs, mussels and cockles.

The chapter on Fruit and Vegetables has been much enlarged. The damage done to young apples by the apple saw-fly larva is described, and so is the damage done by the brown rot of fruit; and further information is given as regards "black spot" in apples and pears. The diseases to which potatoes are liable are described with some fulness. References will be found to damage done by the asparagus beetle and the asparagus fly, and their larvæ; by the bean beetle and black fly; the damage done to cabbages by "black rot"; to onions by the onion fly, etc. The diseases affecting tomatoes are also described, and an interesting disease to which cultivated mushrooms are subject during certain seasons.

Important additions have been made to the chapter on Milk, dealing with preservatives, from the Local Government Board circular of July 11th, 1906, drawing attention to the report of the Departmental Committee on Preservatives and Colouring Matters in Food; to the Local Government Board circular of August 6th, 1912, issued with the prints of the Public Health (Milk and Cream) Regulations, 1912. These Regulations and covering circular are practically quoted in full.

In conclusion, it may be stated that while the illustrations in the Fifth Edition numbered seventy-five plates or woodcuts, including one coloured plate, the illustrations to the Sixth Edition number one hundred plates and woodcuts, including two coloured plates. The illustrations being now so numerous, the subject of each has been printed thereunder.

BIRKENHEAD,

July, 1913.

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THE FOOD INSPECTOR'S HANDBOOK

CHAPTER I

THE FOOD INSPECTOR.—HIS QUALIFICATIONS AND OBLIGATIONS

Inadequate attention given to food inspection—Where practicable a special officer should be appointed—Veterinary-surgeon or butcher?—Honesty, truthfulness, and fairness—Patience, even temper, and courtesy—Health and strength—The training of the five senses—Tact, judgment, common-sense, and fondness for work—Duties of food inspector—Equipment of food inspector—Proposed qualifying examination for meat inspector—Circular letters of Local Government Board thereon.

“FOOD INSPECTOR” is a term which it is difficult to avoid using, though it does not occur in Acts of Parliament. In theory every medical officer of health and inspector of nuisances is a food inspector in his own district, while in markets and fairs the duties of the office are usually discharged by market constables. In practice, there is good reason to believe that very inadequate attention is given to food inspection, and that much food which is allowed to be exposed for sale is diseased, unsound, or unwholesome, and unfit for human food. This could hardly be otherwise, considering that many medical officers of health have their

time fully occupied as general practitioners, and that not unusually inspectors of nuisances are inspectors of weights and measures, school attendance officers, etc. Even in districts where the medical officer of health and inspector of nuisances devote their whole time to their public health duties, opportunities may never have been afforded them of qualifying as competent judges of food.

If, then, the most important work of food inspection is to be efficiently performed (which all will admit to be a desideratum), it appears to be necessary that in every district there should be at hand an officer appointed solely for this duty. To meet the requirements of the Public Health Act, he should be formally made inspector of nuisances, but he should be occupied as food inspector only. The appointment of such officers in large towns is a perfectly simple matter, and not uncommon, but in small towns and rural districts it is not usual, and is beset with difficulties. Wherever there is not food inspection enough to occupy a man's whole time, the authorities of two or more districts should combine and jointly secure the services of a food inspector, in the same way as districts now combine and jointly employ a medical officer of health. Whether, in selecting such an inspector, preference should be given to a veterinary surgeon or a butcher has been much debated.

As the only really difficult part of food inspection is meat inspection, it is well that the man chosen should have a good practical knowledge of meat, but that it is necessary or even desirable that he should be a veterinary surgeon is open to question. Theoretically, a man who has gone through the curriculum of a veterinary college, and passed the qualifying examination, should make an exceptionally well-informed meat inspector. Indeed, it is not too much to say that the ideal meat inspector must be a trained veterinarian.

But in this country the system of meat inspection is not ideal. It is open to any authority wishing to improve the meat inspection locally, and willing to pay a meat inspector such a salary as a capable young veterinary surgeon in fair practice would earn, to appoint a veterinary surgeon. However, when the annual salary offered is £120, or less (as is commonly the case), no self-respecting qualified veterinarian is likely to apply for the post, and the authority will have to be content with the best man they can get at the price. Nor is there any reason why they should not get a man quite equal to such inspection as is attempted under existing conditions. Certainly a large proportion of the meat inspectors already in the service of urban sanitary authorities were selected for the appointment they hold because they were experienced butchers, and results, after many years' trial, have shown that such men make excellent inspectors. It is not as if the man appointed stood alone. He is acting together with the medical officer of health, and in all cases of doubt or difficulty consults him. And when a prosecution is instituted for dealing in diseased meat, and additional evidence required as to the nature of the disease affecting the meat, an expert can be called in. Besides, a butcher is much more likely to know something of the tricks of his own trade, and to be able to detect them, than an outsider. Thus it may be said there is warrant for concluding that a good intelligent butcher will ordinarily make an able food inspector.

The matters next to be considered are the food inspector's qualifications and obligations.

First—He must be honest.—This, it is needless to say, is most essential—his absolute trustworthiness. In view of the importance of the trust committed to the food inspector, the fact that the health (it may be the lives) of many

depend on the conscientious discharge of his duty, and the certainty that he will be tempted by the offer of bribes, his honesty must be altogether above suspicion.

Second—He must be strictly truthful, fair, and unbiassed.—This, it might be thought, is implied in being honest, and it should be. While, however, most inspectors are honest, it is rare to find one absolutely impartial and unprejudiced. Anyone who has been present at the hearing of prosecutions in respect of unsound meat must have heard statements so exaggerated, or coloured, that it is simply impossible that they could be true. The inspector, it may be, is quite unconscious of the exaggeration, because exaggeration has become a habit; but the result is, his evidence cannot be received without some abatement owing to this defect. He is sworn to speak "the truth, the whole truth, and nothing but the truth," and he should simply state the bare facts, omitting nothing essential, even though it may tell distinctly in favour of the defendant. Under cross-examination he should give direct answers in as few words as possible, and never fence with a question.

Third—He must be patient, even-tempered, and uniformly courteous.—The food inspector will necessarily, in the course of his duties, be a cause of impatience and displays of temper in others; it is therefore necessary that he should train himself to bear hard words and bad names with perfect equanimity. So long as he keeps cool and collected he can do his work well, but if ever he allows himself to lose his temper he is almost certain to be guilty of some indiscretion. Courtesy is what everyone has a right to expect from a public official, and its absence is a very grave defect.

Fourth—He must be healthy and strong.—The duties of a food inspector are so arduous that they cannot be

properly performed unless the inspector is in full health and vigour. He must be able to work out of doors in all weathers, and must not object to turning out occasionally when other people are asleep. He must not be subject to any weakness or illness disabling him from time to time, for it is often not possible to fill his place temporarily, and when he is laid up it may be little or no food inspection is attempted. It is necessary that he should have a fair amount of physical strength, for he is liable to be obstructed in the discharge of his duties, and should be at least able to hold his own.

Fifth—His organs of special sense must be in good order and well trained.—As regards *sight*, the inspector's sense of colour should be good, and he should be accustomed to the use of the lens or some simple form of microscope. His sense of *hearing* should be acute, for some disease signs are appreciable by the ear only, and in visiting slaughter-house lairs a very slight change in the breathing sounds may be sufficient to draw attention to an infected animal. The food inspector, no less than the nuisance inspector, should have a perfect sense of *smell*. The presence of several diseases is indicated by their special smell. Again, when animals have been physicked the smell of the stomach will witness to the fact, and may indicate the medicine administered. Then it is scarcely necessary to point out that the first signs of decomposition in animal and vegetable matter may be the presence of effluvia. The sense of *taste* has been quaintly described as an automatic premonitory adviser upon the kinds of food we ought or ought not to indulge in. The tip of the tongue, which is supplied only with nerves of touch, serves to distinguish things acid, alkaline, saline, or pungent. The middle portion of the tongue, supplied with nerves of taste proper, is sensitive mainly to

sweets and bitters. The back part of the tongue is the seat of the taste of meat, butter, oil, and all rich substances. Aromatic flavours, such as that of cinnamon, for instance, are not really tasted, but discerned by the sense of smell. With respect to the fifth sense, it is surely not necessary to insist on anything so obvious as that the food inspector should possess a keen sense of *touch*. His natural capacity, training, and experience are, perhaps, more shown in the delicacy of his sense of touch than in any other way. Touch will accomplish so much, that a really skilful inspector might almost be trusted to examine a roomful of carcasses blindfold, and pick out the diseased ones.

Sixth—He must have tact, judgment, and common-sense.—Touch naturally suggests tact, a characteristic that cannot be dispensed with. The word is not easily defined, but it may be said to indicate the nice feeling, delicate perception, and discernment which keep a man from blundering, and enable him to perform disagreeable duties in the least disagreeable way. Judgment is the faculty which enables a man to look at a matter from all sides, and to consider a question in all its bearings. Common-sense is allied to tact and judgment, but, unlike them, cannot be acquired; common-sense is inborn, like mother-wit, and there is no accounting for the stupid things the man who is without it may do.

Seventh—He must be thoroughly fond of his work.—This fondness implies a taste for reading on matters connected with his vocation, a desire to increase his knowledge, a readiness to receive new ideas, and powers of close observation. Indeed, the really good meat inspector must be something of an enthusiast, so far as his work is concerned.

The duties and position of the food inspector are formally

set forth in the annexed copy of the duties of that officer in the

“BOROUGH OF BIRKENHEAD.

“*Duties of the Inspector of Meat, Fish, etc. etc.*

“The inspector will be required to act generally under the instructions of and be responsible to the medical officer of health, and will submit his books and reports to him every Tuesday morning, or at such other times as he may be instructed

“He will be required to carry out, so far as he may be able, the provisions of Sections 116, 118, and 119 of the Public Health Act, 1875; Section 74 of the Birkenhead Corporation Act, 1881; the Sale of Horseflesh Regulation Act, 1889; and any bye-laws and regulations relating to the inspection of meat, etc., in force in the borough.

“He will be required to keep a book, or books, in which he shall enter particulars of every complaint made to him of any breach of the general law, or of the bye-laws and regulations of the board relating to the preparation and sale of meat, fish, etc. On receiving any complaint so made, he shall forthwith inquire into the matter and report to the medical officer of health.

“He shall also keep a petty cash book and enter all official disbursements therein, and shall keep any other books that may be necessary.

“He shall report in writing on all nuisances from the keeping or depositing or preparation of offal, etc., which in his opinion are nuisances or injurious to health, with a view to the inspector of nuisances taking steps for the abatement of the same.

“He shall inspect from time to time the corporation

slaughter-houses and lairages, and all the private slaughter-houses, as well as all other premises where meat, fish, etc., are exposed for sale, or deposited for the purpose of sale, or of preparation for sale.

"He shall inspect, at his discretion, any meat, poultry, game, fish, fruit, vegetables, corn, bread, flour, milk, or any other food whatsoever deposited for sale; and, in case any articles appear to be intended for the food of man, and are unfit for such purpose, he shall seize the same, and submit them to a justice.

"He shall serve all notices issued on behalf of the board relating to his duties.

"When any notices may be lawfully sent by post, it shall be his duty to post such notices, keeping a sufficient record of all notices so dispatched."

This draft is submitted simply as a general guide, for what it is worth. Of course, the duties and conditions of service will vary with the circumstances of each district.

Equipment of Food Inspector.—A few words here as to the equipment of the food inspector may not be superfluous.

In the first place, an inspector should have a microscope. What is needed is a plain brass stand, with rack adjustment, revolving diaphragm, eye-piece, and achromatic object glasses (say, $\frac{1}{8}$ inch and $\frac{1}{2}$ inch). Probably such a microscope could be obtained for about £3. Doubtless some capable inspectors find that a good pocket lens is sufficient for all requirements. In any case the inspector will do well to carry a good pocket lens, but having a microscope in his office will often be of great assistance.

As regards the tools required by the meat inspector, he

cannot do better than supply himself with what is known as a post-mortem case (see Fig. 1), which may be purchased for about £2.

This ordinarily contains a saw, a long pointed knife, a

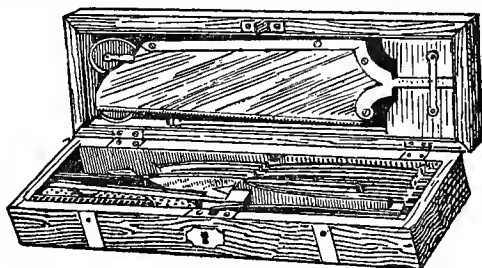


FIG. 1.—Case of post-mortem instruments.

short thick knife (for cutting cartilage), and a chisel, fitting in one spring socket handle; a pair of dissecting forceps,



FIG. 2.—A scalpel.

post-mortem scissors, three scalpels, a set of chain hooks, a blowpipe and needles.



FIG. 3.—Dissecting forceps.

Some inspectors may think they do not require all these tools, and that several tools fitting into one handle is inconvenient. They would say that some eight or nine selected tools would serve their purpose better, and perhaps they are right. A good strong knife, such as butchers use in dressing

a carcase, and a saw, with a large firm handle, are invaluable. The following instruments also will be found to be most useful,

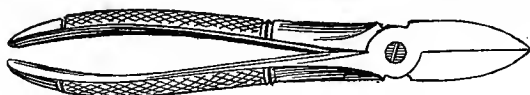


FIG. 4.—Bone-cutting forceps.

viz., a strong scalpel (Fig. 2), for employment with a scalpel the dissecting forceps (Fig. 3), bone-cutting forceps (Fig. 4),



FIG. 5.—Bowel scissors.

bowel scissors (Fig. 5), a probe (Fig. 6), and a director (Fig. 7).

The inspector should be provided with the means of



FIG. 6.—A probe.

keeping his edge-tools quite sharp, and all his tools bright and in order.

It is hardly necessary to point out that a meat inspector's



FIG. 7.—A director.

office should be provided with a sink-stone and a sufficient water supply. The inspector will also require meat-weighing scales and weights.

Proposed Qualifying Examination for Meat Inspector.—The Royal Commission on Tuberculosis con-

sidered that meat inspectors should possess certain qualifications. Their recommendation on the subject will be found on page 21 of their Report (dated April 4th, 1898), and is as follows :—

“We recommend that in future no person be permitted to act as a meat inspector until he has passed a qualifying examination before such authority as may be prescribed by the Local Government Board (or Board of Agriculture), on the following subjects :—

- “(a) The law of meat inspection, and such byelaws, regulations, etc., as may be in force at the time he presents himself for examination.
- “(b) The names and situations of the organs of the body.
- “(c) Signs of health and disease in animals destined for food, both when alive and after slaughter.
- “(d) The appearance and character of fresh meat, organs, fat, and blood, and the conditions rendering them, or preparations from them, fit or unfit for human food.”

In a circular letter of the Local Government Board to Councils of Boroughs and Urban and Rural Districts, bearing date March 11th, 1899, this recommendation is quoted. Next the quotation are the following paragraphs :—

“At present a person cannot be required to pass a qualifying examination of the kind referred to before he acts as a meat inspector ; but it appears to the Board that, in the case of a borough or urban district, where the work connected with the proper discharge of the duty of meat inspection is sufficient to justify the appointment of a separate officer for the purpose, it is very desirable that such an appointment should be made, and that the Council should satisfy themselves that the person appointed pos-

sesses adequate knowledge of the subjects mentioned in the recommendation of the Royal Commission."

"In the smaller districts, where the work of meat inspection is not sufficient to render necessary the appointment of a separate officer, the Board consider that regard should be had to these qualifications in making future appointments to the office of inspector of nuisances."

The final paragraph of the same circular letter is as follows:—

"The Board may at the same time draw attention to Article 19 (7) of their General Order of the 23rd March 1891, with respect to the duties of an inspector of nuisances in relation to the inspection and seizure of meat. They may point out that where an inspector of nuisances is appointed under that Order, or under any order superseded by that Order, he is required by the Article, in any case of doubt arising under it, to report the matter to the medical officer of health with a view of obtaining his advice thereon. The Board think it desirable that any such inspector of nuisances should be reminded of this provision."

In another circular letter of the Local Government Board to Councils of Boroughs and Urban and Rural Districts, dated September 6th, 1901, the Board draw attention to their circular letter of March 11th, 1899, and strongly urge the Councils to direct those of their officers who are employed as meat inspectors to act in accordance with the principles laid down by the Royal Commission.

CHAPTER II

STATUTORY POWERS

Section 131 of the Towns Improvement Clauses Act, 1847—
Section 15 of the Markets and Fairs Clauses Act, 1847—
Sections 116 to 119 of the Public Health Act, 1875—
Section 28 of the Public Health Acts Amendment Act,
1890—Section 47 of the Public Health (London) Act, 1891
—Sale of Horseflesh, etc., Regulation Act, 1889.

To expose for sale as human food, or even to have possession of, with intent to sell, anything unfit for human food, is a nuisance at common law, and punishable as such. Again, knowingly to expose for sale meat which is unfit for human food is an indictable offence. Thus the dealer in unsound food might be proceeded against independently of Public Health Acts and local bye-laws.

The provisions of the common law, though to a great extent superseded by recent legislation, are still in force, and may be resorted to when an alleged offence is punishable at common law and the statutory penalty which could be imposed is considered to be insufficient. Where, for instance, food is sold containing poisonous ingredients, which are the cause of the death of a consumer, the vendor is liable to be indicted for manslaughter. To support such an indictment at common law, the prosecution must produce some evidence tending to show that the vendor knew that the

food at the time of sale was unwholesome. A farmer killed a diseased cow and took the carcase into Chipping Norton to sell by retail. Many people who bought the beef from him at a low price were ill; one of the consumers of the meat, a woman, died of ptomaine poisoning. The farmer was thereupon indicted for manslaughter. Baron Pollock, who tried the case at Oxford, directed the jury that it was necessary for them to answer the question, "Did the defendant, when he took the meat into Chipping Norton, know that it was not fit for human food?" The jury answered this in the affirmative, and convicted accordingly.

Under Section 131 of the Towns Improvement Clauses Act, 1847, which is incorporated with the Public Health Act, 1875, the inspector of nuisances, the medical officer of health, or any other officer appointed by the Council for the purpose, may, at all reasonable times, enter and inspect any building or place within the district, kept or used for the sale of butcher's meat or for slaughtering cattle, and examine whether any cattle or the carcase of any cattle is deposited there. If the officer finds any cattle or the carcase or part of the carcase of any beast which appears unfit for the food of man, he may seize and carry the same before a justice, so that it may be dealt with.

Moreover, where the Council are in a position to establish or regulate markets under Section 167 of the Public Health Act, any inspector of provisions appointed by them may, under Section 15 of the Markets and Fairs Clauses Act, 1847, which is incorporated with the Public Health Act, seize any unwholesome meat sold or exposed for sale in the market and carry the same before a justice to be dealt with.

However, for all practical purposes, the statutory powers under which unwholesome food is now seized and dealt with are contained in Sections 116 to 119 of the Public Health

Act, 1875, and (for the metropolis) Section 47 of the Public Health (London) Act, 1891. The four sections of the Public Health Act referred to (it is convenient to study them together) are as follows :—

“UNSOUND MEAT, ETC.

“116.—Any medical officer of health or inspector of nuisances may at all reasonable times inspect and examine any animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, flour, or milk exposed for sale or deposited in any place for the purpose of sale, or of preparation for sale, and intended for the food of man, the proof that the same was not exposed or deposited for any such purpose, or was not intended for the food of man, resting with the party charged ; and if any such animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, flour, or milk appears to such medical officer or inspector to be diseased or unsound, or unwholesome or unfit for the food of man, he may seize and carry away the same himself or by an assistant, in order to have the same dealt with by a justice.

“117.—If it appears to the justice that any animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, flour, or milk so seized is diseased or unsound, or unwholesome or unfit for the food of man, he shall condemn the same, and order it to be destroyed or so disposed of as to prevent it from being exposed for sale or used for the food of man ; and the person to whom the same belongs or did belong at the time of exposure for sale, or in whose possession or on whose premises the same was found, shall be liable to a penalty not exceeding twenty pounds for every animal, carcase, or fish, or piece of meat, flesh, or fish, or

any poultry or game, or for the parcel of fruit, vegetables, corn, bread or flour, or for the milk so condemned, or, at the discretion of the justice, without the infliction of a fine, to imprisonment for a term of not more than three months.

“The justice who under this section is empowered to convict the offender may be either the justice who may have ordered the article to be disposed of and destroyed, or any other justice having jurisdiction in the place.

“118.—Any person who in any manner prevents any medical officer of health or inspector of nuisances from entering any premises and inspecting any animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, flour, or milk exposed or deposited for the purpose of sale or of preparation for sale, and intended for the food of man, or who obstructs or impedes any such medical officer or inspector or his assistant, when carrying into execution the provisions of this Act, shall be liable to a penalty not exceeding five pounds.

“119.—On complaint made on oath by a medical officer of health or by an inspector of nuisances, or other officer of a local authority, any justice may grant a warrant to any such officer to enter any building or part of a building in which such officer has reason for believing that there is kept or concealed any animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, flour, or milk, which is intended for sale for the food of man, and is diseased, unsound or unwholesome, or unfit for the food of man; and to search for, seize, and carry away any such animal or other article in order to have the same dealt with by a justice under the provisions of this Act.

“Any person who obstructs any such officer in the performance of his duty under such warrant shall, in addition

to any other punishment to which he may be subject, be liable to a penalty not exceeding twenty pounds."

A few words on these sections will not be out of place here. Note first that there is no mention of an inspector of provisions, as in the Markets and Fairs Clauses Act; the person empowered to inspect, seize, etc., is "any medical officer or inspector of nuisances"; when, therefore, an urban or rural authority specially appoints a food inspector, it is necessary to have him formally made "inspector of nuisances," even though his duties be those of food inspector only.

The power to inspect and examine food may be exercised "at all reasonable times"—that is, whenever business is in progress. Unsound food is freely offered for sale late on Saturday nights, and in wholesale markets during the early morning hours, and often before sunrise. Even Sunday is not necessarily an unreasonable time. This point was raised in the case of *Small v. Bickley*. In that case a butcher was convicted of obstructing an inspector in the performance of his duties. The alleged obstruction was in fact a refusal by the butcher on a Sunday afternoon to accompany an inspector from his own place of residence to a lock-up shop, and open the latter for admission of the inspector. On the hearing of an appeal one of the points urged was that the time was unreasonable. The Court, however, quashed the conviction on other grounds, and refused to give a ruling on the point; but from an observation which Mr Justice Blackburn is reported to have made during the argument, it seems clear that, in his opinion, Sunday afternoon was, under the circumstances of that case, a reasonable time to perform the work of meat inspection.

The food which may be inspected and examined is expressly limited in kind. It is "any animal, carcase, meat,

poultry, game, flesh, fish, fruit, vegetables, corn, bread, flour, or milk." Thus cheese, eggs, butter, lard, oil, biscuits, sugar, tea, black puddings, etc., cannot be seized and dealt with under this Act. The word poultry does not include eggs ; cheese and butter, though derived from milk, are not milk ; and biscuits (except water biscuits) do not come under the term bread or flour. The limitation is unfortunate, as any of the articles named as excluded may be exposed for sale in an unsound state.

The food which may be inspected and examined must be "exposed for sale, or deposited in any place for the purpose of sale, and intended for the food of man, the proof that the same was not exposed or deposited for any such purpose, or was not intended for the food of man, resting with the party charged." It sometimes happens that persons having purchased unsound meat, fish, or fruit, bring the article to the inspector, believing that he is empowered to seize it as an article illegally sold to them. As, however, the article is no longer for sale, the medical officer of health and inspector are powerless to deal with it under the Public Health Act.

The inability to examine and seize certain kinds of unsound food, and to examine and seize any food when sold, are defects which have been remedied in some towns under local Acts. The amendment required is very simple ; thus, Section 74 of the Birkenhead Corporation Act, 1881, is as follows :—

"The provisions contained in Sections 116 to 119, inclusive, of the Public Health Act, 1875, shall extend and apply to all articles sold or exposed for sale, or deposited in any place for the purpose of sale, or of preparation for sale, within the borough, and intended for the food of man."

At present, any sanitary authority, urban or rural, by adopting Section 28 of the Public Health Acts Amendment Act, 1890, may effect the required change, so far as relates to the authority's district. Section 28 of the Public Health Acts Amendment Act, 1890, is as follows:—

“(1) Sections 116 to 119 of the Public Health Act, 1875 (relating to unsound meat), shall extend and apply to all articles intended for the food of man, sold or exposed for sale, or deposited in any place for the purpose of sale, or of preparation for sale, within the district of any local authority.

“(2) A justice may condemn any such article, and order it to be destroyed or disposed of, as mentioned in Section 117 of the Public Health Act, 1875, if satisfied, on complaint being made to him, that such article is diseased, unsound, unwholesome, or unfit for the food of man, although the same has not been seized as mentioned in Section 116 of the said Act.”¹

The word “place” in Section 116 may be taken in its widest sense. A place does not mean merely a slaughter-house, shop, or market. Diseased meat placed upon a cart when passing along the streets of Dublin from a slaughter-house to a place for the manufacture of preserved meats was held to have been properly seized under a similar section in the 26 and 27 Vic., c. 117. Still, seizing unsound meat in transit is to be avoided if possible, as the owner or person in charge may allege the meat was not intended for human food, but was being taken to an artificial manure manufactory or a fat-rendering works. Where practicable,

¹ Note the words “although the same has not been seized,” enabling the inspector to obtain an order to destroy an article before he has seized it. This is an advantage when there is a large quantity of the article the inspector desires to have destroyed.

it is better to follow the cart and seize the contents when deposited.

If any of the articles named appear, on inspection, to the medical officer or inspector to be (1) diseased, or (2) unsound, or (3) unwholesome, or (4) unfit for the food of man, he may seize and carry away the same himself or by his assistant, in order to have it dealt with by a justice. Thus in most cases it is only necessary to prove that one of these four terms can fairly be applied to the inspected article. For instance, a liver in which there is an abscess may be seized simply because it is diseased, without reference to the question whether a part of the liver remote from the abscess might not be wholesome. In the same way a fowl, perfectly good when killed, may have been kept too long, and seized merely because unsound. Doubtless also immature fruit (*e.g.*, very unripe windfall apples) may be seized as unwholesome, though neither diseased nor unsound.

It is not required that food seized and carried away be submitted to a justice on the same day the seizure is made, as this is not always possible; but there should be no unreasonable delay. Neither is it necessary for the officer seizing goods to give notice to the owner, nor is the justice to whom the goods are taken bound to summon the owner before the condemnation thereof. Still, when goods are seized it is courteous to notify the owner or person in charge of the goods that, at such and such a time and place, an order to destroy the same will be applied for. An officer has no power to destroy articles seized without an order. Although in practice this is occasionally done by consent of the owner, even written consent does not justify the act.

The justice to whom the application to condemn the

article of food is made may order it to be destroyed, and so disposed of as to prevent it from being exposed for sale or used for the food of man. The best way of destroying condemned food is by burning it in a refuse destructor or gas retort. Where the justice merely orders the article to be disposed of so as to prevent it being made use of for human food, it may, if a carcase or large seizure of meat, be rendered at a tallow-melter's, under the supervision of the inspector. In no case is it sufficient merely to bury the article condemned. If the article be milk it may be poured into the nearest sewer.

Section 117 not only gives a justice power to condemn an article of food by ordering it to be destroyed, etc., but also power to punish the owner of the same by fine or imprisonment. The application in respect of the article seized should be made as early as possible, in fairness to the owner, that the justice may see the article in nearly the same state in which it was when seized. And if it is desired to prosecute the owner, this may be done subsequently, allowing sufficient time to get up the case, for the justice empowered to convict may be either the justice who condemned the article or any other justice having jurisdiction in the place. In prosecuting, though it is not necessary to prove knowledge on the part of the owner of the state of the article, it is well to be provided with evidence in support of a guilty knowledge, such as inadequate price paid for the article, its removal to defendant's premises in the night-time, etc. In cases where the owner is obviously ignorant of the state of the article, it is inexpedient to take further proceedings after obtaining an order to destroy, etc. A penalty is incurred in respect of each piece of meat seized and condemned.

Any person who prevents the medical officer of health or

inspector from entering any premises for the purpose of food inspection, or obstructs or impedes any such officer or his assistant, is liable to a penalty of £5 under Section 118. There must, however, be some active step in the way of prevention or obstruction to secure a fine. Refusing to go some distance to open premises on demand of an officer has been held a prevention of the officer. Concealing an article of unsound food is not itself an offence, and unless there has been an exposure for sale or deposit for the purpose of sale, etc., and the article has been intended for the food of man, no penalty can be inflicted under Section 119 for concealing, and no order can be made in respect of the concealed article.

Under Section 119, on complaint on oath by an officer of a local authority (not necessarily a medical officer of health or inspector of nuisances), a justice may grant a warrant to such officer to enter and search any building in which such officer has reason to believe there is concealed any of the named articles of food intended for and unfit for the food of man, and to seize any such concealed article in order to have the same dealt with by a justice. Any person obstructing such officer, in addition to any other punishment he may be subjected to, is made liable to a penalty not exceeding twenty pounds. The search-warrant may be granted for "any building or part of building," words including cellars, and any kind of erection or out-building. Note also the expression "kept or concealed," showing that no proof of concealment is necessary. "Oath" includes affirmation or declaration of a person allowed by law to affirm or declare. This section appears to apply to cases where articles intended for human food are not actually exposed for sale, and where it would be difficult to allege that they are deposited for the purpose of sale in the terms of Section 116.

It is remarkable that in these sections no right of entry on to any premises is expressly given to the sanitary officers. No power to grant a warrant is given in these sections, nor can any warrant be granted by a justice, except a warrant to search a building in which an officer has sworn that he has reason to believe unsound food is being concealed.

The statutory powers as regards unsound food, for the metropolis, are contained in Section 47 of the Public Health (London) Act, 1891, giving the medical officer of health or sanitary inspector power to seize, and the justice power to order the destruction of unsound food. The powers are similar to those in Sections 116 and 117 of the Public Health Act, except that all articles of food, solid or liquid, and articles sold, and articles not seized, may be dealt with, and that the penalties are increased, and under certain circumstances the wholesale dealer is liable.¹ The section reads as follows:—

“47. (1)—Any medical officer of health or sanitary inspector may, at all reasonable times, enter any premises, and inspect and examine—

“(a) Any animal, intended for the food of man, which is exposed for sale, or deposited in any place for the purpose of sale, or of preparation for sale, and

“(b) Any article, whether solid or liquid, intended for the food of man, and sold or exposed for sale or deposited in any place for the purpose of sale, or of preparation for sale,

the proof that the same was not exposed or deposited for any such purpose, or was not intended for the food of man,

¹ The sanitary authority is also required to cause to be removed any article of food, unsound, unwholesome, or unfit for food of man, on the written request of the person in possession of the same.

resting with the person charged; if any such animal or article appears to such medical officer or inspector to be diseased, or unsound, or unwholesome, or unfit for the food of man, he may seize and carry away the same himself, or by an assistant, in order to have the same dealt with by a justice.

“(2)—If it appears to a justice that any animal or article which has been seized, or is liable to be seized, under this section is diseased, or unsound, or unwholesome, or unfit for the food of man, he shall condemn the same, and order it to be destroyed or so disposed of as to prevent it from being exposed for sale or used for the food of man; and the person to whom the same belongs, or did belong, at the time of sale, or exposure for sale, or deposit for the purpose of sale, or of preparation for sale, or in whose possession, or on whose premises, the same was found, shall be liable, on summary conviction, to a fine not exceeding fifty pounds for every animal or article; or, if the article consists of fruit, vegetables, corn, bread, or flour, for every parcel thereof so condemned, or, at the discretion of the court, without the infliction of a fine, to imprisonment for a term of not more than six months, with or without hard labour.

“(3)—Where it is shown that any article liable to be seized under this section, and found in the possession of any person, was purchased by him from another person for the food of man, and when so purchased was in such a condition as to be liable to be seized and condemned under this section, the person who sold the same shall be liable to the fine and imprisonment above mentioned, unless he proves that at the time he sold the said article he did not know, and had no reason to believe, that it was in such condition.

“(4)—Where a person convicted of an offence under this

section has been within twelve months previously convicted of an offence under this section, the court may, if it thinks fit, and finds that he knowingly and wilfully committed both such offences, order that a notice of the facts be affixed, in such form and manner, and for such period not exceeding twenty-one days, as the court may order, to any premises occupied by that person, and that the person do pay the costs of such affixing; and if any person obstructs the affixing of such notice, or removes, defaces, or conceals the notice while affixed during the said period, he shall for each offence be liable to a fine not exceeding five pounds.

“(5)—If the occupier of a licensed slaughter-house is convicted of an offence under this section, the court convicting him may cancel the license for such slaughter-house.

“(6)—If any person obstructs an officer in the performance of his duty under any warrant for entry into any premises granted by a justice in pursuance of this Act for the purposes of this section, he shall, if the court is satisfied that he obstructed with intent to prevent a discovery of an offence against this section, or has, within twelve months previously, been convicted of such obstruction, be liable to imprisonment for any term not exceeding one month in lieu of any fine authorised by this Act for such obstruction.

“(7)—A justice may act in adjudicating on an offender under this section, whether he has or has not acted in ordering the animal or article to be destroyed or disposed of.

“(8)—Where a person has in his possession any article which is unsound or unwholesome and unfit for the food of man, he may, by written notice to the sanitary authority, specifying such article and containing a sufficient identifi-

cation of it, request its removal, and the sanitary authority shall cause it to be removed as if it were trade refuse."

The Sale of Horseflesh, etc., Regulation Act, 1889, is not intended to prohibit the sale of what is a wholesome and cheap food, but to prevent the fraud of its being sold under a false name. The first two sections, requiring signs on horseflesh shops, and prohibiting the sale of horseflesh as other meat, are very complete. They are as follows:—

"1.—No person shall sell, offer, expose, or keep for sale any horseflesh for human food elsewhere than in a shop, stall, or place over or upon which there shall be at all times painted, posted, or placed in legible characters of not less than four inches in length, and in a conspicuous position, and so as to be visible throughout the whole time, whether by night or day, during which such horseflesh is being offered or exposed for sale, words indicating that horseflesh is sold there.

"2.—No person shall supply horseflesh for human food to any purchaser who has asked to be supplied with some meat other than horseflesh, or with some compound article of food which is not ordinarily made of horseflesh."

The expression "compound article" doubtless has reference to sausages, collops, brawn, and cooked pies, into which it is alleged horseflesh is introduced.

Section 3, giving power to inspect meat, is as follows:—

"3.—Any medical officer of health or inspector of nuisances, or other officer of a local authority, acting on the instructions of such authority, or appointed by such authority for the purposes of this Act, may at all reasonable times inspect and examine any meat which he has reason to believe to be horseflesh, exposed for sale, or deposited for the purpose of sale, or of preparation for sale, and intended for human food, in any place other than such shop, stall,

or place as aforesaid, and if such meat appears to him to be horseflesh, he may seize and carry away, or cause to be seized and carried away, the same, in order to have the same dealt with by a justice as hereinafter provided."

Note that under this Act the meat inspector is not necessarily the medical officer of health, or inspector of nuisances. In other respects the powers to inspect, examine, and seize are similar to those in Section 116 of the Public Health Act.

Section 4, giving power to grant search warrants, is as follows :—

"4.—On complaint made on oath by a medical officer of health or inspector of nuisances, or other officer of a local authority, any justice may grant a warrant to any such officer to enter any building, or part of a building, other than such shop, stall, or place as aforesaid, in which such officer has reason for believing that there is kept or concealed any horseflesh which is intended for sale or for preparation for sale for human food contrary to the provisions of this Act; and to search for, seize, and carry away, or cause to be seized and carried away, any meat that appears to such officer to be such horseflesh, in order to have the same dealt with by a justice as hereinafter provided.

"Any person who shall obstruct any such officer in the performance of his duty under this Act shall be deemed to have committed an offence under this Act."

This, it will be seen, is similar to Section 119 of the Public Health Act.

Section 5, giving power to justices with reference to the disposal of horseflesh, does not suggest that the seized meat should be destroyed or disposed of to prevent its being used as human food. It is as follows :—

“5.—If it appears to any justice that any meat seized under the foregoing provisions of this Act is such horseflesh as aforesaid, he may make such order with regard to the disposal thereof as he may think desirable; and the person in whose possession or on whose premises the meat was found shall be deemed to have committed an offence under this Act, unless he prove that such meat was not intended for human food contrary to the provisions of this Act.”

Section 6, stating the penalty, is as follows:—

“6.—Any person offending against any of the provisions of this Act, for every offence shall be liable to a penalty not exceeding twenty pounds, to be recovered in a summary manner; and if any horseflesh is proved to have been exposed for sale to the public in any shop, stall, or eating-house other than in such shop, stall, or place as in the first section mentioned, without anything to show that it was not intended for sale for human food, the onus of proving that it was not so intended shall rest upon the person exposing for sale.”

Section 7, giving a definition of horseflesh, is wonderfully inclusive. It is as follows:—

“7.—For the purposes of this Act ‘horseflesh’ shall include the flesh of asses and mules, and shall mean horseflesh cooked or uncooked, alone or accompanied by or mixed with any other substance.”

The insertion of the words “or eating-house,” in Section 6, and “cooked or uncooked,” in Section 7, suggest that cheap restaurants furnish a convenient market for the fraudulent disposal of horseflesh.

Section 8 specifies the local authorities for the purposes of this Act; and Section 9 deals with its application to Scotland. They are as follows:—

“8.—For the purposes of this Act the local authorities

shall be in the City of London, and the liberties thereof, the Commissioners of Sewers, and, in the other parts of the county of London, the vestries and district boards acting in the execution of the Metropolis Local Management Acts, and, in other parts of England, the urban and rural sanitary authorities, and, in Ireland, the urban and rural sanitary authorities under the Public Health (Ireland) Act, 1878.

“9.—In the application of this Act to Scotland, the expression ‘justice’ shall include sheriff and sheriff substitute, and the expression ‘local authority’ shall mean any local authority authorised to appoint a public analyst, under the sale of Food and Drugs Act, 1875, and the procedure for the enforcement of this Act shall be in the manner provided in the 33rd Section of the said Sale of Food and Drugs Act, 1875.”

The Sale of Horseflesh, etc., Regulation Act, 1889, came into operation on September 29th, 1889.

CHAPTER III

STATUTORY POWERS (*continued*)

ADULTERATION OF FOOD, ETC.

Acts relating to the adulteration of coffee and tea passed in the eighteenth century—The Bread Act, 1836—The Sale of Food and Drugs Act, 1875—The Sale of Food and Drugs Act Amendment Act, 1879—The Margarine Act, 1887—The Sale of Food and Drugs Act, 1899—Butter and Margarine Act, 1907—Public Health (Regulations as to Food) Act, 1907—Regulations of the Local Government Board as to Unsound Food and Foreign Meat.

It forms no part of the duty of a medical officer of health to analyse food or drugs for the detection of adulteration, and no part of the duty of an inspector of nuisances to gather samples for the purpose of having them submitted for analysis. A local authority, however, may appoint the medical officer of health as analyst of food and drugs sold within the authority's district, or may appoint the inspector of nuisances an inspector under the Sale of Food and Drugs Acts. Thus, though food inspection does not necessarily include the detection of adulteration, it is well that an officer who may, sooner or later, be charged with the execution of the Sale of Food and Drugs Acts, should know something of the statutes by means of which adulteration is detected and punished.

There are a few references to the adulteration of coffee and tea in certain Acts passed in the eighteenth century.

Under Section 23 of an Act, passed in the fifth year of George I., against clandestine running of uncustomed goods, and for the more effectual preventing of frauds relating to the customs, it was enacted that from and after March 25th, 1719, any person or persons who added "water, grease, butter, or any other material whatsoever, which will increase the weight or damnify and prejudice the said coffee in its goodness, he, she, or they shall forfeit the sum of £20 for every such offence." A trader or dealer in coffee buying or selling any such adulterated coffee was under the same Section of this Act liable to the same penalty. This Section has been overridden to a great extent by the provisions of certain Sections of an Act passed in the eleventh year of George I., an Act for more effectually preventing frauds and abuses in the public revenues. Under Section 5 of this Act it was enacted that, from and after June 24th, 1725, "no dealer in tea, or manufacturer or dryer thereof, or pretending so to be, shall counterfeit or adulterate tea, or cause or procure the same to be counterfeited or adulterated, or shall alter, fabricate, or manufacture tea with *terra japonica*,¹ or with any drug or drugs whatsoever, or shall mix, or cause or procure to be mixed with tea any leaves, other than leaves of tea, or other ingredients whatsoever, on pain of forfeiting or losing the tea so counterfeited, adulterated, altered, fabricated, manufactured, or mixed, and other thing or things whatever added thereto, or mixed or used therewith, and also the sum of £100." This section, it will be noted, deals only with the person who adulterates tea or causes it to be adulterated. Under Section 9 of the same Act, it is an offence for any person, at the time

¹ Catechu.

of roasting coffee, or soon after, or before selling thereof, to "use or mix or cause to be used or mixed therewith, or to add or cause to be added thereto, butter, lard, grease, water, or other materials, whereby such coffee is rendered less wholesome," the penalty for every such offence being a fine of £100. Any trader or dealer in coffee knowingly buying or selling any coffee so mixed, or to which such an addition has been made, is under this section liable to the same penalty.

Under Section 11 of an Act passed in the fourth year of George II., to prevent frauds in the revenue of excise with respect to starch, coffee, tea, and chocolate, it was enacted that, from and after September 29th, 1731, any person or persons who shall be a dealer in or seller of tea, shall dye, fabricate, or manufacture any sloe leaves, liquorice leaves, or the leaves of tea that have been used, or the leaves of any other tree, shrub, or plant in imitation of tea, or shall mix, colour, stain, or dye such leaves or tea with *terra japonica*, sugar, molasses, clay, logwood, or with other ingredients or materials whatsoever, or shall sell, or utter, offer, expose for sale, or shall have in his, her, or their custody or possession, any such dyed, fabricated, or manufactured leaves in imitation of tea, or any such coloured, stained or dyed leaves, or tea mixed with any ingredients before mentioned, or with any other ingredients whatsoever, such person or persons shall for every pound of such leaves so dyed, fabricated, or manufactured in imitation of tea, and for every pound of such mixed, coloured, stained, or dyed leaves or tea, forfeit the sum of £10. Dealers alone could be proceeded against for adulteration under this Act. More far-reaching is an Act, passed in the seventeenth year of George III., for the more effectual prevention of the manufacture of ash, elder, sloe, and other leaves in

imitation of tea, and to prevent frauds in the revenue of excise in respect of tea. Section 1 enacts that from and after June 1st, 1777, if any person or persons whatsoever, whether he or she or they be dealer or dealers in, or seller or sellers of tea or not, shall dye, fabricate, or manufacture any sloe leaves, liquorice leaves, or the leaves of tea which have been used, or the leaves of any ash, elder, or other tree, shrub, or plant in imitation of tea, or shall mix, colour, stain, or dye any such leaves with *terra japonica*, copperas, sugar, molasses, clay, logwood, or with any other ingredients or materials whatsoever, or shall sell or utter, offer or expose for sale, or shall have in his or her or their custody or possession any such dyed, fabricated, or manufactured leaves in imitation of tea, or any such coloured, stained, or dyed leaves, or any leaves that should be dyeing, fabricating, or manufacturing in imitation of tea, and shall be thereof convicted, such person or persons shall respectively, for every pound of such leaves so dyed, fabricated, or manufactured in imitation of tea, or dyeing, fabricating, or manufacturing in imitation of tea, and for every pound of such mixed, stained, or dyed leaves of tea, forfeit the sum of £5, and upon non-payment thereof the justice or justices shall commit the offender or offenders to the common goal of the county or place where the offence shall be committed. Under Section 2 of this Act if any person or persons shall have in his, her, or their custody or possession any quantity (exceeding 6 lb. weight) of sloe leaves or the leaves of ash, elder, or any other tree, shrub, or plant, green or manufactured, and shall not prove to the satisfaction of the justice or justices before whom the matter shall be heard that such leaves were gathered with the consent of the owners of the trees, shrubs, or plants from which

the said leaves were taken, and that such leaves were gathered for some other use or uses, and not for the purpose of fabricating or manufacturing the same in imitation of tea, and shall be thereof convicted, such person or persons shall respectively for every pound of such green or manufactured leaves so found in his, her, or their custody or possession forfeit the sum of £5, and upon non-payment thereof, such justice or justices shall commit the offender or offenders to the common gaol of the county or place where the offence shall be committed. Under Section 3, if any officer of excise, etc., make oath before a justice that he suspects any such leaves are concealed, the justice may grant a warrant for entering any place in search of the same, and to seize and carry away as forfeited all such leaves, together with the wagons, carts, bags, boxes, tubs, or other vessels or package containing the same, and the justice granting the warrant or another may order the leaves seized to be conveyed to some convenient place and then to be burned or otherwise destroyed, and to order the wagons, carts, boxes, bags, tubs, or other vessels or package containing the same to be forthwith sold. Any person obstructing or hindering the officer or person having such authority shall be liable for such offence on conviction to forfeit £50, and on non-payment thereof to be sent to the common gaol. No leaves are to be burned till after the expiration of twenty-four hours from seizure. Under Section 5, leaves aforesaid are to be deemed in the custody and possession of the occupier of the house, outhouse, garden, etc., wherein or whereon they are found, and he is liable to the penalties of this Act if the leaves were lodged there with his consent. Under Section 9, a conviction under this Act is not to be quashed for want of form.

The Bread Acts passed in the third year of George IV.

and in the sixth and seventh of William IV. respectively deal with the City of London, etc., and within ten miles of the Royal Exchange, and the remainder of the United Kingdom, except Ireland, which is dealt with by a very similar Act, passed in the first and second Victoria. Under these statutes it is enacted that "bread may be made of flour or meal of wheat, barley, rye, oats, buckwheat, Indian corn, peas, beans, rice or potatoes, or any of them, and with any common salt, pure water, eggs, milk, barm, leaven, potato or other yeast, and mixed in such proportions as they shall think fit, and with no other ingredient or matter whatsoever, subject to the regulations hereinafter contained." It would appear that to secure a conviction it must be shown that the baker knowingly used a forbidden ingredient. A person convicted of using a forbidden ingredient is liable to a penalty not exceeding £10 for every such offence, or in default to imprisonment with or without hard labour,¹ and the convicting justice may cause the offender's name, place of abode and offence to be published in a newspaper printed or published in or near the place where the offence was committed. It is also an offence to "put into any corn, meal or flour which shall be ground, dressed, bolted, or manufactured for sale," any "ingredient or mixture whatsoever not being the real and genuine produce of the corn or grain," or to knowingly sell or offer or expose for sale, "any meal or flour of one sort of corn or grain, as the meal or flour of any other sort of corn or grain, or any ingredient whatsoever mixed with the meal or flour so sold, or offered or exposed for sale. The offender is liable to a penalty not exceeding £20. It is unlawful to make for sale, or sell or expose for sale "any bread made wholly or partially of peas or beans or potatoes, or of any sort of corn or

¹ "With or without hard labour" is not in the City of London Act.

grain other than wheat," unless such bread be marked with a large Roman **M**. The person making, selling, or exposing for sale such bread without such mark is liable to a penalty not exceeding 10s. for every pound of such bread, and so in proportion for any less quantity. It is, however, provided that wheat bread "in the making of which potato yeast shall be used," need not be marked. Justices are empowered to grant search warrants for the searching of millers' or mealmen's or bakers' premises, and if any adulterated flour, bread, etc., be found, or any ingredients "deemed to have been used or intended to be used" for such adulteration be found, the same may be seized or disposed of as the justices in their discretion shall think proper. The miller, mealman, or baker, on whose premises ingredients for adulteration are found, is liable to a penalty not exceeding £10 for the first offence, £5 for the second offence, and £10 for every subsequent offence, and in default to imprisonment with or without hard labour, and the convicting justice may cause the offender's name, place of abode, and offence to be published in a newspaper printed or published in or near the place where the offence was committed. Any person wilfully obstructing or hindering a duly authorised search, or the seizure of any meal, flour, bread, or any forbidden ingredient or mixture which shall be found in such search, is liable for every such offence to a penalty not exceeding £10. On complaint being made that the offence was occasioned by the wilful default of a journeyman or servant, the justice is to take steps for having such journeyman or servant brought before him, and examine into the matter of such complaint, and on proof thereof, to adjudge and order what reasonable sum of money shall be paid by any such journeyman or servant to his master, by way of recompense to him for the money he shall

have paid. If the journeyman or servant neglect or refuse, on conviction, to make immediate payment of the sum he is ordered to pay, the justice is to order him to be committed to prison and kept to hard labour for a term not exceeding one calendar month and not less than ten days. In the City of London a journeyman or servant, in default of payment, may be imprisoned for any term not exceeding six months. No miller, mealman, or baker is to act as justice of the peace under this Act, the penalty for presuming so to do being £100. Any person resisting or making forcible opposition against any person employed in the execution of this Act, is liable for every such offence to a penalty not exceeding £10. Under the Irish Bread Act, the penalty is not to exceed £5. Proceedings are not to be quashed for want of form. Any person convicted under the Bread Act, thinking himself aggrieved, may appeal to Quarter Sessions. In Scotland, penalties incurred under the Act, after deducting charges, are to be paid to the poor of the place where the penalties are awarded. In the City of London the penalty is to be applied for the use of the poor of the parish. Elsewhere a moiety is to go to the informer, and a moiety to the general rate; or, if there be no informer, the whole is to go to the general rate. No person is to be convicted unless the complaint has been made within forty-eight hours after the offence has been committed, "or within such reasonable time as the justice or justices shall deem fit,"¹ except in the case of perjury. No person prosecuted to conviction under the Bread Act is "liable to be prosecuted for the same offence under any other law." There is a proviso in the Bread Act of 1836 that nothing it contains shall in any way extend, effect, lessen, or infringe upon any rights or customs of the Universities of Oxford or

¹ These words are not in the City of London Act.

Cambridge, or of lords of any leets, or the rights of any clerk of the market in any place, except so far as relates to the assize of bread, and the regulation of the price and weight thereof. All rights and privileges shall be held and exercised by the parties entitled thereto. There is a somewhat similar proviso in the Act dealing with the City of London.

The principal Act dealing with the Sale of Food and Drugs was passed in 1875, and this was followed by the Sale of Food and Drugs Amendment Act, 1879, the Margarine Act, 1887, the Sale of Food and Drugs Act, 1899, and the Butter and Margarine Act, 1907. In Section 26 of the Act of 1899 a definition of food is given:—"For the purposes of the Sale of Food and Drugs Act, the expression 'food' shall include every article used for food and drink by man, other than drugs or water, and any article which ordinarily enters into, or is used in the composition or preparation of human food; and shall also include flavouring matters and condiments." According to the Act of 1875, the term "drug" includes medicine of internal and external use.

The principal provisions of the Sale of Food and Drugs Act, 1875, are as follows:—

Section 3 prohibits the mixing, colouring, staining, or powdering with injurious ingredients any article of food, or selling the same, under a penalty in each case not exceeding £50 for the first offence, and for a subsequent offence imprisonment for a period not exceeding six months, with hard labour. Section 4 prohibits mixing, etc., with any ingredient so as to affect injuriously the quality or potency of any drug, or selling the same under a like penalty. Section 5 exempts those otherwise liable to be convicted under Section 3 or 4 in case of proof of absence of know-

ledge, and that such knowledge could not with reasonable diligence have been obtained.

Section 6 enacts that no person shall sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance, and quality of the article demanded by such purchaser, under a penalty not exceeding £20,¹ provided that an offence shall not be deemed to be committed under this section in the following cases ; that is to say :—(1) Where any matter or ingredient not injurious to health has been added to the food or drug because the same is required for the production or preparation thereof as an article of commerce, in a state fit for carriage or consumption, and not fraudulently to increase the bulk, weight or measure of the food or drug, or conceal the inferior quality thereof ; (2) where the drug or food is a proprietary medicine, or is the subject of a patent in force, and is supplied in the state required by the specification of the patent ; (3) where the food or drug is compounded as in this Act mentioned ; (4) where the food is unavoidably mixed with some extraneous matter in the process of collection or preparation.

Section 7 provides that no person shall, under a similar penalty,¹ sell any compound article of food, or compounded drug which is not composed of ingredients in accordance with the demand of the purchaser.

Under Section 8 it is “provided that no person shall be guilty of any such offence as aforesaid in respect of the sale of an article of food or a drug mixed with any matter or ingredient not injurious to health, and not intended fraudulently to increase its bulk, weight, or measure, or conceal its inferior quality, if at the time of delivering such article

¹ Penalty since increased, and power given to Court to imprison in certain cases.

or drug he shall supply to the person receiving the same a notice, by a label distinctly and legibly written or printed on or with the article or drug, to the effect that the same is mixed.

By Section 8, "no person shall, with the intent that the same may be sold in its altered state without notice, abstract from an article of food any part of it so as to affect injuriously its quality, substance, or nature, and no person shall sell any article so altered without making disclosure of the alteration, under a penalty in each case not exceeding £20.¹

Section 10 deals with the appointment of analysts, and Section 11 gives the Town Council of a Borough power to engage the analyst of another Borough, or of the county. Section 12 enables a purchaser of an article of food to have it analysed on payment of a sum not exceeding 10s. 6d., where an analyst is appointed, or to an outside analyst where none is appointed, for such sum as may be agreed upon.

Section 13 enacts that "any medical officer of health, inspector of nuisances, or inspector of weights and measures, or any inspector of a market, or any police constable, under the direction and at the cost of the local authority appointing such officer, inspector, or constable, or charged with the execution of this Act, may procure any sample of food or drugs, and if he suspect the same to have been sold to him contrary to any provision of this Act, shall submit the same to be analysed by the analyst of the district or place for which he acts, or, if there be no such analyst then acting for such place, to the analyst of another place, and such analyst shall, upon receiving pay-

¹ Penalty since increased, and power given to Court to imprison in certain cases.

ment, as is provided in the last section, with all convenient speed analyse the same and give a certificate to such officer, wherein he shall specify the result of the analysis."

According to Section 14, the person purchasing any article with the intention of submitting the same to analysis shall, after the purchase shall have been completed, forthwith notify to the seller, or his agent selling the article, his intention to have the same analysed by the public analyst, and shall divide the article into three parts to be then and there separated, and each part to be marked and sealed, or fastened up in such manner as its nature will permit, and shall, if required to do so, deliver one of the parts to the seller or his agent. He shall afterwards retain one of the said parts for future comparison, and submit the third part, if he deems it right to have the article analysed, to the analyst.¹

Section 16 provides that if the analyst does not reside within two miles of the residence of the person requiring the article to be analysed, such article may be forwarded to the analyst through the post as a registered "letter." The last word is now, under an amendment in the Act of 1899, to be "parcel."

Under Section 17 (as extended by Section 5 of the Act of 1879), a person refusing to sell to any authorised officer, in any street or open place of public resort, any article for analysis is liable to a penalty not exceeding £10.

Section 18 provides that "the certificate of the analyst

¹ This section is given as amended by the Food and Drugs Act, 1899. Under this section, before its amendment, it was not necessary for the purchaser to divide the article into three parts, so long as the seller was given the opportunity of keeping one-third. When Section 14 was amended Section 15 became unnecessary and was repealed.

shall be in the form set forth in the schedule hereto or to the like effect.

Section 19 requires every public analyst to make a quarterly report, giving certain particulars, to the authority appointing him, and requires the authority to transmit to the Local Government Board a certified copy of such report.

According to Section 20, "when the analyst, having analysed any article, shall have given his certificate of the result, from which it may appear that an offence against some one of the provisions of this Act has been committed, the person causing the analysis to be made may take proceedings for the recovery of the penalty herein imposed for such offence, before any justices in petty sessions assembled having jurisdiction in the place where the article or drug sold was actually delivered to the purchaser in a summary manner.

Section 21 directs that, at the proceedings, the certificate of the analyst shall be sufficient evidence of the facts therein stated, unless the defendant require the analyst to be called as a witness and the production of the parts of the article retained by the purchaser. The defendant and his wife may be examined at their request.

Under Section 22, "the justices before whom any complaint may be made, or the court before whom any appeal may be heard, under this Act, may, upon the request of either party, in their discretion, cause any article of food or drug to be sent to the Commissioners of Inland Revenue, who shall thereupon direct the chemical officers of their department at Somerset House to make the analysis, and give a certificate to such justices of the results of the analysis ; and the expenses of such analysis shall be paid by the complainant or the defendant, as the justices may by order direct."

Section 23 gives any person convicted of an offence under this Act the right of Appeal to Quarter Sessions, or to the Recorder, etc.

According to Section 24, in any prosecution where the fact of an article having been sold in a mixed state has been proved, if the defendant desires to rely on any exemption in the Act, he must prove the exemption.

According to Section 25, "if the defendant in any prosecution under this Act prove to the satisfaction of the justices or court that he had purchased the article in question as the same in nature, substance, and quality as that demanded of him by the prosecutor, and with a written warranty to that effect, that he had no reason to believe at the time when he sold it that the article was otherwise, and that he sold it in the same state as when he purchased it, he shall be discharged from the prosecution, but shall be liable to pay the costs incurred by the prosecution, unless he shall have given due notice to him that he will rely on the above defence."

Section 26 deals with the application of penalties imposed and recovered under the Act.

Under Section 27 forging, or uttering knowing to be forged, any certificate or warranty is a misdemeanour punishable on conviction by imprisonment for a term not exceeding two years with hard labour. Wilful misapplication of a certificate or warranty renders a person liable to a penalty not exceeding £20. Wilfully giving a false label with an article sold renders a person liable to the same penalty.

Section 28 states that proceedings by indictment and contracts are not to be affected ; provided that in any action brought by a person for a breach of contract on the sale of an article of food or a drug, such person may recover the

amount of any penalty in which he may have been convicted under this Act, together with any costs paid on conviction and incurred in his defence, on his proving that the article of food or drug was sold to him as an article or drug of the same nature, substance and quality as that demanded of him, and that he purchased it not knowing it to be otherwise, and sold it in the state in which he purchased it.

Section 29 deals with the expenses of executing the Act.

Section 30 makes special provisions as to tea, dealing with its inspection and analysis as imported. The object is to prevent adulterated tea being imported.

Section 31 interprets the term "exhausted" as applied to tea in this Act as meaning and including "any tea which has been deprived of its proper quality, strength, or virtue by steeping, infusion, decoction, or other means."

Under Section 32, "for the purposes of this Act, every liberty of a Cinque Port not comprised within the jurisdiction of a borough shall be part of the county in which it is situated, and subject to the jurisdiction of the justices of such county."

Sections 33 and 34 deal with the application of the Act to Scotland and Ireland.

The principal provisions of the Sale of Food and Drugs Amendment Act, 1879, are as follows:—

According to Section 2, it is no defence in any prosecution under the principal Act, to allege that the purchaser, having bought only for analysis, was not prejudiced by such sale; neither is it a good defence to prove that the article of food or drug in question, though defective in nature or in substance or in quality, was not defective in all three respects.

Under Section 3 any officer charged with the execution

of the Adulteration Acts may, under the direction of the local authority, procure a sample of milk in course of delivery, at the place of delivery, and submit it to an analyst; and if adulteration be certified, may take proceedings in all respects as if the officer purchased the same from seller or consignor.

Under Section 4 a seller or consignor, or any person entrusted for the time being with the charge of the milk, who refuses to allow the officer to take the milk he requires, is liable to a penalty not exceeding £10

Section 6 enacts that in determining whether an offence has been committed under Section 6 of the principal Act by selling, to the prejudice of the purchaser, spirits not adulterated otherwise than by the admixture of water, it shall be a good defence to prove that such admixture has not reduced the spirit more than 25 degrees under proof¹ for brandy, whisky, or rum, or 35 degrees under proof for gin.

According to Section 7, "every liberty having a separate court of quarter sessions, except a liberty of a cinque port, shall be deemed to be a county within the meaning of this Act."

Section 9 contains a provision for Boroughs, with a separate police establishment, and being liable to be assessed to the county rates as to the repayment of the proportion contributed towards the expenses incurred by the county in the execution of the principal Act. Section 10, relating to time for proceedings, has been repealed by the Act of 1899.

The Margarine Act, 1887, was passed with the object of making further provision for protecting the public against

¹ In 100 parts of proof spirit there are 49·24 of absolute alcohol, and 50·76 of water.

the sale as butter of substances made in imitation of butter, as well as of butter mixed with any such substance. This Act came into operation on January 1st, 1888.

Section 3 gives two definitions. The word "butter" is defined as meaning "the substance usually known as butter, made exclusively from milk and cream, or both, with or without salt or other preservative, and with or without the addition of colouring matter." The word "margarine" is defined as meaning "all substances, whether compounds or otherwise, prepared in imitation of butter, and whether mixed with butter or not; no such substance shall be lawfully sold, except under the name of margarine, and under the conditions set forth in this Act."

Under Section 4: "every person dealing in margarine, whether wholesale or retail, whether a manufacturer, importer, or as consignor, or consignee, or as commission agent, or otherwise, who is found guilty of an offence under this Act, shall be liable on summary conviction for the first offence to a fine not exceeding £20, and for the second offence to a fine not exceeding £50, and for the third,¹ or any subsequent offence, to a sum not exceeding £100.

Under Section 5, an employer charged with an offence against this Act is entitled to have any other person whom he charges as the actual offender brought to justice before the court at the time appointed for hearing the charge, and if, after the commission of the offence has been proved, the employer proves to the satisfaction of the court that he had used due diligence to enforce the execution of this Act, and that the other person had committed the offence without his knowledge, consent, or connivance, the other

¹ A third offence is now under certain circumstances punishable by imprisonment with or without hard labour, for a period not exceeding three months.

person shall be summarily convicted, and the employer shall be exempt from any penalty.

Section 6 requires every person dealing in margarine to conform to the following regulations:—Every package, whether open or closed, and containing margarine, shall be branded or durably marked “Margarine” on the top, bottom, and sides, in printed capital letters, not less than three-quarters of an inch square, and if such margarine be exposed for sale by retail there shall be attached to each parcel thereof so exposed, and in such a manner as to be clearly visible to the purchaser, a label marked in printed capital letters not less than one and a half inches square, “Margarine,” and every person selling margarine by retail, save in a package duly branded or durably marked as aforesaid, shall in every case deliver the same to the purchaser in (*or with*) a paper wrapper, on which shall be printed in capital letters (*not less than a quarter of an inch square*),¹ “Margarine.”

According to Section 7, “every person dealing with, selling or exposing, or offering for sale, or having in his possession for the purpose of sale, any quantity of margarine contrary to the provisions of this Act, shall be liable to conviction for an offence against this Act, unless he shows to the satisfaction of the court before whom he is charged that he purchased the article in question as butter, and with a written warranty or invoice to that effect, that he had no reason to believe at the time when he sold it that the article was other than butter, and that he sold it in the same state as when he purchased it, and in such case he shall be dis-

¹ The words in italics have been repealed by the Act of 1899. For the words “not less than a quarter of an inch square” are substituted the words “not less than half an inch long and distinctly legible”; and no other printed matter is to appear on the wrapper.

charged from the prosecution, but shall be liable to pay the costs incurred by the prosecutor unless he shall have given due notice to him that he will rely upon the above defence."

Section 8 reads:—"All margarine imported into the United Kingdom of Great Britain and Ireland, and all margarine, whether imported or manufactured within the United Kingdom of Great Britain and Ireland, shall, whenever forwarded by any public conveyance, be duly consigned as margarine; and it shall be lawful for any officer of H.M.'s Customs or Inland Revenue, or any medical officer of health, inspector of nuisances, or police constable, authorised under Section 13 of the Sale of Food and Drugs Act, 1875, to procure samples for analysis if he shall have reason to believe that the provisions of this Act are infringed on this behalf, to examine and take samples from any package, and ascertain, if necessary, by submitting the same to be analysed, whether an offence against this Act has been committed."

Section 9 requires that "every manufactory of margarine within the United Kingdom of Great Britain and Ireland shall be registered by the owner or occupier thereof with the local authority from time to time in such manner as the Local Government Boards of England and Ireland, and the Secretary for Scotland respectively, may direct, and every such owner or occupier carrying on such manufacture in a manufactory not duly registered shall be guilty of an offence under this Act."

According to Section 10, "any officer authorised to take samples under the Sale of Food and Drugs Act, 1875, may, without going through the form of purchase provided by that Act, but otherwise acting in all respects in accordance with the provisions of the said Act as to dealing with samples, take for the purposes of analysis samples of any

butter, or substitutes purporting to be butter, which are exposed for sale, and are not marked margarine, as provided under this Act, and any such substance not being so marked shall be presumed to be exposed for sale as butter."

Section 11, which seems to refer to prosecutions of private prosecutors, "any part of any penalty recovered under this Act may, if the court shall so decide, be paid to the person who proceeds for the same, to reimburse him for the legal cost of obtaining the analysis, and any other reasonable expenses to which the Court shall consider him entitled."

By Section 12, "all proceedings under this Act shall, save as expressly varied by this Act, be the same as prescribed by Sections 12 to 28 inclusive of the sale of Food and Drugs Act, 1875, and all officers employed under that Act are hereby empowered and required to carry out the provisions of this Act."

The Sale of Food and Drugs Act, 1899, provides as follows :—

Section 1 (1.) If there is imported into the United Kingdom any of the following articles, namely :—

- (a) Margarine or margarine cheese, except in packages conspicuously marked "Margarine" or "Margarine cheese," as the case may require ; or
- (b) Adulterated or impoverished butter (other than margarine) or adulterated or impoverished milk or cream, except in packages or cans conspicuously marked with a name or description indicating that the butter or milk or cream has been so treated ; or
- (c) Condensed, separated, or skimmed milk, except in tins or other receptacles, which bear a label whereon the words "Machine-skimmed Milk"

or "Skimmed Milk," as the case may require, are printed in large and legible type ; or

- (d) Any adulterated or impoverished article of food to which Her Majesty may by Order in Council direct that this Section may be applied, unless the same be imported in packages or receptacles conspicuously marked with a name or description indicating that the article has been so treated ;

the importer shall be liable, on summary conviction, for the first offence to a fine not exceeding £20, for the second offence to a fine not exceeding £50, and for any subsequent offence to a fine not exceeding £100.¹

(2.) Under this sub-section the word "importer" is to include any person who is in the possession of or in anywise entitled to the custody or control of the article. Prosecutions for offences under this section are to be undertaken by the Commissioners of Customs ; and subject to the provisions of this Act, this section is to have effect as if it were part of the Customs Consolidation Act, 1876.

(3.) This sub-section requires the Commissioners of Customs, in accordance with directions given by the Treasury after consultation with the Board of Agriculture, to take such samples of consignments of imported articles of food as may be necessary for the enforcement of the foregoing provisions of this Section.

(4.) This sub-section reads :—"Where the Commissioners of Customs take a sample of any consignment in pursuance of such directions they shall divide it into not less than three parts, and send one part to the importer and one part to the principal chemist of the Government laboratories, and retain one part."

¹ The court has power to imprison for a third offence in certain cases.

(5.) This sub-section reads:—"In any proceedings under this Section the certificate of the principal chemist of the result of the analysis shall be sufficient evidence of the facts therein stated, unless the defendant require that the person who made the analysis be called as a witness."

(6.) This sub-section reads:—"If, in any case, the Commissioners of Customs are of opinion that an offence against this Section has been committed, they shall communicate to the Board of Agriculture for their information the name of the importer, and such other facts as they possess or may obtain as to the destination of the consignment."

(7.) This sub-section reads:—"For the purposes of this Section an article of food shall be deemed to be adulterated or impoverished if it has been mixed with any other substance, or if any part of it has been abstracted so as in either case to affect injuriously its quality, substance or nature."

"Provided that the article of food shall not be deemed to be adulterated by reason only of the addition of any preservative or colouring matter of such a nature and in such quantity as not to render the article injurious to health."

Under Section 2, the Local Government Board and Board of Agriculture are each empowered to direct an officer of the Board to procure for analysis samples of any articles of food, and thereupon the officer is to have all the powers of procuring samples conferred by the Sale of Food and Drugs Acts, and those Acts shall apply as if the officer were an officer authorised to procure samples under the Act of 1875, except that the officer procuring the sample is to divide it into four parts, and deal with three of such parts in the manner directed by Section 14 of the Act of 1875, sending the fourth part to the Board. The Board is required to communicate the result of the analysis of any such sample to the local authority, and thereupon the local

authority are empowered and it becomes their duty to cause proceedings to be taken as if they had caused the analysis to be made.

According to Section 3, it is the duty of every local authority entrusted with the execution of the laws relating to the sale of food and drugs to appoint a public analyst and put in force from time to time the powers with which they are invested, and in particular to direct their officers to take samples for analysis. Powers are given to the Local Government Board or Board of Agriculture to act in default of local authority. The expenses incurred by the Board in so doing are to be paid by the local authority to the Board on demand, and in default may be recovered with costs. Under the same Section any public analyst appointed under the Sale of Food and Drugs Acts is to furnish such proof of competency as may from time to time be required by the Local Government Board.

Section 4 empowers the Board of Agriculture to make regulations for determining what deficiency in any of the normal constituents of genuine milk, cream, butter, or cheese, or what addition of extraneous matter or proportion of water, in any sample of milk (including condensed milk), cream, butter, or cheese, shall for the purposes of the Sale of Food and Drugs Act raise a presumption, until the contrary is proved, that the milk, cream, butter, or cheese is not genuine or is injurious to health, and an analyst shall have regard to such regulations in certifying the result of an analysis under those Acts. Any regulations made under this section must be notified in the *London and Edinburgh Gazette*, and also be made known in such other manner as the Board of Agriculture may direct.

Under Section 5 the provisions of the Margarine Act, 1887, as amended by this Act, extend to margarine cheese,

and shall apply, with the substitution of "margarine cheese" and "cheese" for "margarine" and "butter." All margarine cheese sold or dealt in otherwise than by retail, shall either be enclosed in packages marked in accordance with the Margarine Act, 1887, as amended by this Act, or be itself conspicuously branded with the words "margarine cheese."

Under Section 6 a package containing margarine or margarine cheese required to be branded or marked, must have the brand or mark on the package itself, and not solely on the label attached thereto. The letters required to be printed on the paper wrapper in which margarine or margarine cheese is sold shall be capital block letters not less than half an inch long and distinctly legible and no other printed matter shall appear on the wrapper.

Section 7 contains provisions as to manufacturers of, and wholesale dealers in, margarine and margarine cheese. Every such manufacturer or dealer is to keep a register showing the quantity and destination of each consignment of such substance, and the register is to be open to any officer of the Board of Agriculture. Such officer may enter at all reasonable times, inspect processes of manufacture, and take samples for analysis. Any occupier of a manufactory or dealer who—

- (a) Fails to keep such a register, or
- (b) Refuses to produce the register when required to do so by an officer of the Board of Agriculture, or
- (c) Fails to keep the register posted up to date, or
- (d) Wilfully makes an entry in the register which is false in any particular, or
- (e) Fraudulently omits to enter any particular which ought to be entered in the register,

shall be liable, on summary conviction, for the first offence, to a sum not exceeding £10, and for any subsequent offence, to a sum not exceeding £50.

The provisions of Section 9 of the Margarine Act, 1887, relating to registration of manufactories, shall extend to any premises wherein the business of a wholesale dealer in margarine or margarine cheese is carried on. The registration of a manufactory or other premises is to be forthwith notified by the local authority to the Board of Agriculture.

Section 8 restricts the amount of butter fat to be put in margarine to 10 per cent. Any person who manufactures, sells, exposes for sale, or imports any margarine which contains more than that percentage shall be guilty of an offence under the Margarine Act, 1887.

According to Section 9, every person who, himself or by his servant, in any highway or place of public resort, sells milk or cream from a vehicle or from a car or other receptacle shall have conspicuously inscribed on the vehicle or receptacle his name and address, and in default shall be liable on summary conviction to a fine not exceeding £2.

Section 10 requires that in the case of a sample taken of milk in course of delivery, or of margarine or margarine cheese forwarded by public conveyance, the person taking the sample shall forward by registered parcel or otherwise a portion of the sample, marked and sealed or fastened up, to the consignor, if his name and address appear on the case or package containing the article sampled.

The provisions as to separated milk are very important. Section 11 reads:—

“Every tin or other receptacle containing condensed separated or skimmed milk must bear a label clearly visible to the purchaser, on which the words ‘Machine-skimmed Milk,’ or ‘Skimmed Milk,’ as the case may require, are

printed in large and legible type, and if any person sells or exposes or offers for sale condensed separated or skimmed milk in contravention of this section he shall be liable on summary conviction to a fine not exceeding ten pounds."

Section 12, dealing with notice of mixture given by label, is as follows:—

"The label referred to in Section 8 of the Sale of Food and Drugs Act, 1875, shall not be deemed to be distinctly and legibly written or printed within the meaning of that section unless it is so written or printed that the notice of mixture given by the label is not obscured by other matter on the label: Provided that nothing in this enactment shall hinder or affect the use of any registered trade mark, or of any label which has been continuously in use for at least seven years before the commencement of this Act; but the Comptroller-General of Patents, Designs, and Trade Marks shall not register any trade mark purporting to describe a mixture unless it complies with the requirements of this enactment."

Under Section 14, the provisions of Section 3 and Section 4 of the Sale of Food and Drugs Act Amendment Act, 1879 (relating to the taking of samples of milk in course of delivery), shall apply to every other article of food: Provided that no samples shall be taken under this section except upon the request or with the consent of the purchaser or consignee.

Section 15 amends Section 16 of the Sale of Food and Drugs Act, 1875, substituting the words "registered parcel" for the words "registered letter."

Under Section 16 any person who wilfully obstructs or impedes an inspector or other officer in the course of his duties under these Acts, or by gratuity, bribe, promise, or other inducement, prevents, or attempts to prevent, the due

execution of such duties, is liable, on summary conviction, for the first offence to a sum not exceeding £20, for a second offence to a sum not exceeding £50, and for any subsequent offence to a sum not exceeding £100.

Section 17 deals with penalties for offences under the Sale of Food and Drugs Acts. It is divided into two subsections, which read as follows:—

“(1) Where, under any provision of the Sale of Food and Drugs Act, 1875, a person guilty of an offence is liable to fine which may extend to £20 as a maximum, he shall be liable for a second offence under the same provision to a fine not exceeding £50, and for any subsequent offence to a fine not exceeding £100.”

“(2) Where, under any provision of the Sale of Food and Drugs Acts, a person guilty of an offence is liable to a fine exceeding £50, and the offence, in the opinion of the court, was committed by the personal act, default, or culpable negligence of the person accused, that person shall be liable (if the court is of opinion that a fine will not meet the circumstances of the case) to imprisonment, with or without hard labour, for a period not exceeding three months.”

Section 18 affords necessary protection to the seller in respect of articles sold in tins or packets. It reads:—

“Notwithstanding anything in Section 17 of the Sale of Food and Drugs Act, 1875, where any article of food or drug is exposed for sale in an unopened tin or packet duly labelled, no person shall be required to sell it except in the unopened tin or packet in which it is contained.”

Section 19 also contains provisions in favour of the seller. It is imperative, and there can be no mistaking its meaning. It reads:—

“(1) When any article of food or drug has been purchased from any person for test purposes, any prosecution under the Sale of Food and Drugs Acts in respect of the sale thereof, notwithstanding anything contained in Section 20 of the Sale of Food and Drugs Act, 1875, shall not be instituted after the expiration of twenty-eight days from the time of the purchase.

“(2) In any prosecution under the Sale of Food and Drugs Acts the summons shall state particulars of the offence or offences alleged, and also the name of the prosecutor, and shall not be made returnable in less time than fourteen days from the day on which it is served, and there must be served therewith a copy of any analyst's certificate obtained on behalf of the prosecutor.”

Section 20 contains provisions as to the use of warranty or invoice as defence, and proceedings against the warrantor.

“(1) A warranty or invoice shall not be available as a defence to any proceeding under the Sale of Food and Drugs Acts unless the defendant has, within seven days after service of the summons, sent to the purchaser a copy of such warranty or invoice with a written notice stating that he intends to rely on the warranty or invoice, and specifying the name and address of the person from whom he received it, and has also sent a like notice of his intention to such person.

“(2) The person by whom such warranty or invoice is alleged to have been given shall be entitled to appear at the hearing and to give evidence, and the court may, if it thinks fit, adjourn the hearing to enable him to do so.

“(3) A warranty or invoice given by a person resident outside the United Kingdom shall not be available as a defence to any proceedings under the Sale of Food and

Drugs Acts, unless the defendant proves that he had taken reasonable steps to ascertain, and did, in fact, believe in the accuracy of the statement contained in the warranty or invoice.

“(4) Where the defendant is a servant of the person who purchased the article under a warranty or invoice, he shall, subject to the provisions of this section, be entitled to rely on Section 25 of the Sale of Food and Drugs Act, 1875, and Section 7 of the Margarine Act, 1887, in the same way as his employer or master would have been entitled to do if he had been the defendant, provided that the servant prove that he had no reason to believe that the article was otherwise than that demanded by the prosecutor.

“(5) Where the defendant in a prosecution under the Sale of Food and Drugs Acts has been discharged under the provisions of Section 25 of the Sale of Food and Drugs Act, 1875, as amended by this Act, any proceedings under the Sale of Food and Drugs Acts for giving the warranty relied on by the defendant in such prosecution, may be taken as well before a court having jurisdiction in the place where the article of food or drug to which the warranty relates was purchased for analysis as before a court having jurisdiction in the place where the warranty was given.

“(6) Every person who, in respect of any article of food or drug sold by him as principal or agent, gives to the purchaser a false warranty in writing, shall be liable on summary conviction for the first offence to a fine not exceeding £20, for the second offence to a fine not exceeding £50, and for every subsequent offence to a fine not exceeding £100, unless he proves to the satisfaction of the court that when he gave the warranty he had reason to believe that the statements or descriptions contained therein were true.

“**21.**—The justices or court referred to in Section 22 of the Sale of Food and Drugs Act, 1875, shall, on the request of either party under that section, cause an article of food or drug to be sent to the Commissioners of Inland Revenue for analysis, and may, if they think fit, do so without any such request.

“**22.**—(1) At the hearing of the information in any proceeding under the Sale of Food and Drugs Acts, the production by the defendant of a certificate of analysis by a public analyst in the form prescribed in Section 18 of the Sale of Food and Drugs Act, 1875, shall be sufficient evidence of the facts therein stated, unless the prosecutor requires that the analyst be called as a witness.

“(2) A copy of every such certificate shall be sent to the prosecutor at least three clear days before the return day, and if it be not so sent the court may, if it thinks fit, adjourn the hearing on such terms as may seem proper.

“**23.**—This Act shall apply to Scotland with the substitution for ‘the Local Government Board’ of ‘the Local Government Board for Scotland,’ and all powers and duties vested in or imposed on the Secretary for Scotland in relation to the Sale of Food and Drugs Acts shall be transferred to, vested in, or imposed on the Local Government Board for Scotland.

“**24.**—This Act shall apply to Ireland with the substitution for ‘the Board of Agriculture’ of ‘the Department of Agriculture and Technical Instruction for Ireland,’ and for ‘the Local Government Board’ of ‘the Local Government Board for Ireland,’ and for ‘the London and Edinburgh Gazettes’ of ‘the Dublin Gazette.’

“**25.**—In this Act, unless the context otherwise requires—

The expression ‘margarine cheese’ means any sub-

stance, whether compound or otherwise, which is prepared in imitation of cheese, and which contains fat not derived from milk.

The expression 'cheese' means the substance usually known as cheese, containing no fat derived otherwise than from milk.

The expression 'local authority' means any local authority authorised to appoint an analyst for the purposes of the Sale of Food and Drugs Acts, and the expression 'public analyst' means an analyst so appointed.

Other expressions have the same meaning as in the Sale of Food and Drugs Acts, and an offence under this Act shall be treated as an offence under those Acts.

"26.—For the purposes of the Sale of Food and Drugs Acts the expression 'food' shall include every article used for food or drink by man, other than drugs or water, and any article which ordinarily enters into or is used in the composition or preparation of human food; and shall also include flavouring matters and condiments."

Under Section 27, the Sale of Food and Drugs Act, 1875, is repealed to the following extent:—

In Section 2, the definition of the term "food."

In Section 14, the words "offer to," and the words "proceed accordingly and shall."

Section 15.

In Section 27, the words from "Every person who shall give a false warranty in writing" to "a penalty not exceeding twenty pounds."

The Sale of Food and Drugs Act Amendment Act, 1879 :—
Section 10.

The Margarine Act, 1887 :—

In Section 6, the words “or with,” and the words “not less than a quarter of an inch square.”

The Post-office Act, 1891 :—

Section 7.

Under Section 28, this Act may be cited as the Sale of Food and Drugs Act, 1899; and the Sale of Food and Drugs Act, 1875, the Sale of Food and Drugs Act Amendment Act, 1879, the Margarine Act, 1887, and this Act may be cited collectively as the Sale of Food and Drugs Acts, 1875 to 1899, and are in this Act referred to as the Sale of Food and Drugs Acts.

This Act came into operation on January 1st, 1900.

The Butter and Margarine Act, 1907, is described as :—
‘An Act to make further provision with respect to the Manufacture, Importation, and Sale of Butter and Margarine and similar Substances.’

This Act received the Royal Assent on August 21st, 1907, and came into operation on January 1st, 1908.

Section 1 deals with the registration of factories and consignments.

“1.—(1) The provisions of section nine of the Margarine Act, 1887, as amended by section seven of the Sale of Food and Drugs Act, 1899, relating to the registration of manufactories of margarine, shall, with the necessary adaptations apply to—

- (a) Butter factories, that is to say, any premises on which by way of trade butter is blended, reworked, or subjected to any other treatment, but not so as to cease to be butter : and
- (b) Any premises on which there is manufactured any milk-blended butter, that is to say, any mixture pro-

duced by mixing or blending butter with milk or cream (other than condensed milk or cream), or on which there is carried on the business of a wholesale dealer in milk-blended butter.

“(2) The provisions of section seven of the Sale of Food and Drugs Act, 1899, relating to registers of consignments of margarine, shall, with the necessary adaptations, apply to consignments of milk-blended butter.

“(3) Premises shall not be used as a butter factory if they form part of or communicate, otherwise than by a public street or road, with any other premises which are required to be registered under the Sale of Food and Drugs Acts or under paragraph (b) of this section, and if any premises are so used the occupier thereof shall be guilty of an offence under this Act, and the local authority shall remove from the register of butter factories kept by them any premises used as a butter factory contrary to this provision :

“Provided that this subsection shall not apply to premises which on the first day of January one thousand nine hundred and seven were being used as a butter factory and formed part of or communicated with premises which were then registered under the Sale of Food and Drugs Acts, if and so long as the Board of Agriculture and Fisheries so direct.”

Section 2 makes provision for the inspection of factories, and is as follows :—

“2.—(1) Any officer of the Board of Agriculture and Fisheries or of the Local Government Board shall have power to enter at all reasonable times any premises registered under the Sale of Food and Drugs Acts or this Act, and to inspect any process of manufacture, blending, reworking, or treatment used therein, and to take samples for analysis of any butter, margarine, margarine cheese, milk-blended

butter, or of any article capable of being used in the manufacture, treatment, or adulteration of any such article as aforesaid.

“(2) An officer of a local authority who is authorised to procure samples under the Sale of Food and Drugs Acts shall, if specially authorised in that behalf by the local authority, have the like powers of entry, inspection, and sampling as regards any premises registered with the authority as a butter factory.

“(3) If the Board of Agriculture and Fisheries have reason to believe—

- (a) that on any unregistered premises there is carried on any process of manufacture, blending, reworking, or treatment or any wholesale dealing which under the Sale of Food and Drugs Acts or this Act cannot be carried on except on registered premises; or
- (b) that on any premises butter is by way of trade either made or stored, and that for the purposes of those Acts inspection is desirable,

the Board may specially authorise any officer of the Board to enter the premises, and in such case the officer shall have the like powers of entry, inspection, and sampling as if the premises were registered.

“(4) Where under this section a special authority is required, an officer of the Board or of a local authority shall not be entitled to exercise any of his powers under this section unless, if so requested by or on behalf of the occupier of the premises to be entered, he produces his authority.

“(5) Subsection (2) of section seven of the Sale of Food and Drugs Act, 1899, is hereby repealed.”

Section 3 deals with the prohibition of adulterants in butter factories. It is very brief.

“3. If any substance intended to be used for the adultera-

tion of butter is found in any butter factory, the occupier of the factory shall be guilty of an offence under this Act, and if any oil or fat capable of being so used is found it shall be deemed to be intended to be so used, unless the contrary is proved."

Section 4 states the limit of moisture allowed in butter, margarine, and milk-blended butter. It is as follows:—

"4.—(1) If any butter which, when prepared for sale or consignment, contains more than sixteen per cent. of water is in any butter factory, or if any margarine which, when prepared for sale or consignment, contains more than sixteen per cent. of water is in any margarine factory, or if any such butter or margarine is consigned from a butter factory or margarine factory, the occupier of the factory or consignor, as the case may be, shall (whether the excess of moisture is due to adulteration or not) be guilty of an offence under this Act, unless the occupier or consignor proves to the satisfaction of the court that the butter or margarine was not made, blended, reworked, or treated in the factory.

"(2) Any person who manufactures, sells, or exposes or offers for sale, or has in his possession for the purpose of sale, any milk-blended butter which contains more than twenty-four per cent. of water, shall be guilty of an offence under this Act."

Section 5 contains provisions as to the importation of butter, margarine, and milk-blended butter. It is in the following terms:—

"5.—(1) There shall be included in the list of articles importation of which is made an offence by section one of the Sale of Food and Drugs Act, 1899, the following articles:—

- (e) Butter containing more than sixteen per cent. of water;

- (f) Margarine containing more than sixteen per cent. of water or more than ten per cent. of butter fat ;
- (g) Milk-blended butter containing more than twenty-four per cent. of water ;
- (h) Milk-blended butter, except in packages conspicuously marked with such name as may be approved by the Board of Agriculture and Fisheries for the purpose ;
- (j) Butter, margarine, or milk-blended butter which contains a preservative prohibited by any regulation made under this Act, or an amount of a preservative in excess of the limit allowed by any such regulation ;

and in the said section the words 'adulterated or impoverished butter (other than margarine) or' and the words 'butter or' shall be repealed.

"(2) The maximum fine for an offence under the said section one, as amended by this section, shall, where the article in respect of which the offence was committed is butter, margarine, margarine cheese, or milk-blended butter, be either such as is provided in the said section one, or, at the election of the Commissioners of Customs, a fine equal to the value of the goods imported bearing the same mark or description, to be estimated and taken according to the rate and price for which goods of the like kind but of the best quality were sold at or about the time of the importation.

"(3) In any proceeding under the said section one as amended by this section the certificate of the principal chemist of the Government Laboratories, or, if the person who made the analysis be called as a witness, the evidence of that person, that an imported substance is margarine or milk-blended butter shall raise a presumption, until the contrary is proved, that the substance is margarine or milk-

blended butter, and the defendant shall not be entitled to require the person who made the analysis to be called as a witness unless he shall, at least three clear days before the return day, give notice to the prosecutor that he requires his attendance, and deposit with the prosecutor a sum sufficient to cover the reasonable costs and expenses of his attendance which costs and expenses shall be paid by the defendant in the event of his conviction.

“(4) Where a sample taken under the said section one as amended by this section is certified by the principal chemist to be margarine or milk-blended butter the Commissioners of Customs shall upon receiving the certificate forthwith notify the importer thereof.”

Section 6 gives the regulations as to milk-solids in butter.

“6. The power of making regulations under section four of the Sale of Food and Drugs Act, 1899, shall extend to making regulations as to the proportion of any milk-solid other than milk-fat in any sample of butter or milk-blended butter.”

Section 7 contains regulations as to preservatives.

“7.—(1) The Local Government Board may, after such inquiry as they deem necessary, make regulations for prohibiting the use as a preservative of any substance specified in such regulations in the manufacture or preparation for sale of butter, margarine, or milk-blended butter, or for limiting the extent to which, either generally or as regards any particular substance or substances, preservatives may be used in the manufacture or preparation for sale of butter, margarine, or milk-blended butter.

“(2) Any regulations made under this section shall be notified in the London, Edinburgh, or Dublin Gazette as the case may require, and shall also be made known in such other manner as the Local Government Board may direct.

“(3) Any person who manufactures, sells, or exposes or offers for sale, or has in his possession for the purpose of sale, any butter, margarine, or milk-blended butter which contains a preservative prohibited by a regulation under this section or an amount of a preservative in excess of the limit allowed by any such regulation, shall be guilty of an offence under this Act.”

Section 8 gives the new requirements as to marking wrappers in connection with margarine.

“8.—If in any wrapper enclosing margarine, or on any package containing margarine, or on any label attached to a parcel of margarine, or in any advertisement or invoice of margarine a person dealing in margarine describes it by any name other than either ‘margarine,’ or a name combining the word ‘margarine’ with a fancy or other descriptive name approved by the Board of Agriculture and Fisheries and printed in type not larger than and in the same colour as the word “margarine,” he shall be guilty of an offence under this Act.”

Section 9 regulates the sale of milk-blended butter.

“9.—(1) Milk-blended butter shall be dealt with under such name or names as may be approved by the Board of Agriculture and Fisheries and under the conditions applicable to the sale or description of margarine, with the substitution of an approved name for the word ‘margarine,’ and with this modification, that, in any case where, in order to comply with those conditions, the article is delivered to the purchaser in a wrapper, there shall, in addition to the approved name, be printed on the wrapper in such manner as the Board approve such description of the article, setting out the percentage of moisture or water contained therein, as may be approved by the Board.

“(2) Milk-blended butter, whenever forwarded by any

public conveyance, shall be duly consigned under the name which, as respects the article consigned, has been approved by the Board under this section; subject to this modification, section eight of the Margarine Act, 1887, shall apply to milk-blended butter in like manner as it applies to margarine.

“(3) If any person deals with, sells, or exposes or offers for sale, or has in his possession for the purpose of sale, or describes any milk-blended butter contrary to the provisions of this section, he shall be guilty of an offence under this Act, but any defence which would be a defence under section seven of the Margarine Act, 1887, as respects margarine, shall be a defence under this section as respects milk-blended butter.”

Section 10 deals briefly with the names of margarine, etc.

“10.—A name shall not be approved by the Board of Agriculture and Fisheries for use in connection with margarine if it refers to or is suggestive of butter or anything connected with the dairy interest, nor shall such a name be approved as a name under which milk-blended butter may be imported or dealt with.”

Section 11 specifies the penalties for offences.

“11.—(1) Any person guilty of an offence under this Act shall be liable on conviction under the Summary Jurisdiction Acts for a first offence to a fine not exceeding twenty pounds and for a second offence to a fine not exceeding fifty pounds and for a third or any subsequent offence to a fine not exceeding one hundred pounds, and in cases where imprisonment can be inflicted under section seventeen of the Sale of Food and Drugs Act, 1899, to such imprisonment as is by that section authorised.

“(2) Section five of the Margarine Act, 1887 (which exempts employers from liability in certain cases), and section

eleven of the same Act (which relates to the appropriation of penalties), and section twelve of the same Act (which relates to proceedings under that Act), shall apply to proceedings under this Act, with the substitution of references to this Act for references to the Margarine Act, 1887."

Section 12 amends Section 8 of the Margarine Act, 1887.

"12. Except in the Administrative County of London, section eight of the Margarine Act, 1887, shall have effect as if the words 'inspector of weights and measures' were inserted after the word 'nuisances.'"

Section 13 substitutes a new definition of margarine for the definition of margarine in the Margarine Act, 1887.

"13.—(1) For the purposes of the Sale of Food and Drugs Acts and this Act the expression 'margarine' shall mean any article of food, whether mixed with butter or not, which resembles butter and is not milk-blended butter.

"(2) The above definition shall be substituted for the definition of margarine in the Margarine Act, 1887."

The 14th and last section refers to the short title, construction, and commencement of the Act.

"14.—(1) This Act may be cited as the Butter and Margarine Act, 1907, and shall be construed as one with the Sale of Food and Drugs Act, 1899, and may be cited with the Sale of Food and Drugs Acts, as the Sale of Food and Drugs Acts, 1875 to 1907.

"(2) This Act shall come into operation on the first day of January one thousand nine hundred and eight."

The only other Act there is occasion to refer to is the Public Health (Regulations as to Food) Act, 1907. It is described as:—"An Act to enable regulations to be made for the prevention of danger arising to public health from the importation, preparation, storage, and distribution of articles of food."

This Act received the Royal Assent on August 28th, 1907. It consists of three sections only, which are as follows :—

“**I.**—(1) The power of making regulations under the Public Health Act, 1896, and the enactments mentioned in that Act, shall include the power of making regulations authorising measures to be taken for the prevention of danger arising to public health from the importation, preparation, storage, and distribution of articles of food or drink (other than drugs or water) intended for sale for human consumption, and, without prejudice to the generality of the powers so conferred, the regulations may—

- (a) provide for the examination and taking of samples of any such articles ;
- (b) apply, as respects any matters to be dealt with by the regulations, any provision in any Act of Parliament dealing with the like matters, with the necessary modifications and adaptations ;
- (c) provide for the recovery of any charges authorised to be made by the regulations for the purposes of the regulations or any services performed thereunder.

“(2) For the purposes of regulations made under this Act, articles commonly used for the food or drink of man shall be deemed to be intended for sale for human consumption unless the contrary is proved.

“(3) In the application of this Act to Scotland, Part IV. of the Public Health (Scotland) Act, 1897, shall be substituted for the Public Health Act, 1896.

“**2.**—All regulations made under this Act shall be laid as soon as may be before Parliament, and the Rules Publication Act, 1893, shall apply to such regulations as if they were statutory rules within the meaning of section one of that Act, and that Act as so applied shall, notwithstanding

anything in subsection five of section one thereof, extend to Scotland, with the substitution of a reference to the Edinburgh Gazette for the reference to the London Gazette.

"3.—This Act may be cited as the Public Health (Regulations as to Food) Act, 1907."

Two papers containing Regulations of the Local Government Board made under the above Act, both dated September 12th, 1908, were sent, with a printed circular letter, dated September 16th, 1908, to port and other sanitary authorities, etc. One is headed "First Series: Unsound Food" and the other "Foreign Meat."

Article I. of the Regulations dealing with "Unsound Food" sets forth the interpretation to be given to "words" and "terms" unless the contrary intention appears.

Article II. briefly states that these Regulations shall come into operation on October 1st, 1908, and shall apply and have effect in relation to the district of every sanitary authority throughout England and Wales.

Article III. deals with the application of statutory provisions.

Article IV. states the powers, etc., of medical officer of health in relation to unsound food.

Article V. states the powers, etc., of justice in relation to unsound food.

Article VI. sets forth the powers, etc., of medical officer of health and justice in relation to unsound food in special cases.

Article VII. makes regulations as to the record of unsound food destroyed or otherwise dealt with, which is to be kept.

Article VIII. regulates the taking of samples, etc.

Article IX. states that notice required to be given by the medical officer of health may be sent by post.

Article X. requires that answers to questions, etc., asked by a medical officer of health or justice, or other competent authority, shall be truthfully given.

Article XI. deals with the appointment and powers, etc., of assistants.

Article XII. requires the combination of local authorities, when ordered by the Local Government Board, for the purposes of these Regulations.

Article XIII. regulates the determination of difficulties.

Article XIV. states that all powers given by these Regulations shall be deemed to be in addition to, and not in derogation of, any other powers conferred.

Article XV. states that these Regulations may be cited as "The Public Health (First Series: Unsound Food) Regulations, 1908."

Article I. of the Regulations dealing with "Foreign Meat" sets forth the interpretation to be given to "words" and "terms" unless the contrary intention appears.

Article II. briefly states that these Regulations shall come into operation on November 1st, 1908.

Article III. regulates the examination of foreign meat by customs officer and by medical officer of health.

Article IV. regulates the examination of foreign meat by medical officer of health in special cases.

Article V. contains the rules for guidance of medical officer of health.

Article VI. regulates the notice to be given by sanitary authority to importer.

Article VII. gives power for the destruction of foreign meat.

Article VIII. states the proceedings required for proof that foreign meat is not intended for sale.

Article IX. prohibits the removal or sale of foreign meat in certain cases.

Article X. makes regulations as to the record of foreign meat destroyed, which is to be kept.

Article XI. authorises that the certificates and notices may be sent by post.

Article XII. regulates the taking of samples, etc.

Article XIII. forbids the improper landing of foreign meat.

Article XIV. requires that answers to questions, etc., asked by a medical officer of health or justice, or other competent authority, shall be truthfully given.

Article XV. deals with substitutes for, or assistants of, medical officers of health.

Article XVI. refers to combination of local authorities, when required by the Local Government Board.

Article XVII. regulates the determination of difficulties.

Article XVIII. states that these Regulations may be cited as "The Public Health (Foreign Meat) Regulations, 1908."

On September 30th, 1909, another circular letter was sent by the Local Government Board to port and other sanitary authorities, etc., enclosing copies of "The Public Health (Foreign Meat) Amending Regulations, 1909," dated September 27th, 1909.

These Regulations contain three Articles.

Article I. revokes Article I. of the Public Health (Foreign Meat) Regulations, 1908, and substitutes for the Article I. revoked another Article I.

Article II. states that these Regulations shall come into operation on September 30th, 1909, and that the Public Health (Foreign Meat) Regulations, 1908, and any Order theretofore made in pursuance of Article XVI. of these Regulations, shall apply and have effect, and shall be enforced and executed in such form and in such manner as

will give full effect to the alterations made by these Regulations, and as if throughout the Public Health (Foreign Meat) Regulations, 1908, references to an officer of customs and excise were substituted for references to an officer of customs, and as if, throughout any such Order, references to the Public Health (Foreign Meat) Regulations, 1908, as altered by these Regulations, were substituted for references to the Public Health (Foreign Meat) Regulations, 1908, and references to the officer of customs and excise were substituted for references to the officer of customs.

Article III. states that these Regulations may be cited as "The Public Health (Foreign Meat) Amending Regulations, 1909."

A print of the circular letter dated September 16th, 1908, the circular letter dated September 30th, 1909, the Public Health (First Series: Unsound Food) Regulations, 1908, the Public Health (Foreign Meat) Regulations, 1908, and the Public Health (Foreign Meat) Amending Regulations, 1909, may each of them be obtained from the King's Printer for one penny.

CHAPTER IV

ANIMALS, CARCASSES, AND BUTCHERS' MEAT

Preliminary division of the subject—Live animals—Carcases—Approximate weight of certain organs of animals—Good meat—Meat not of the description represented—Sale of horseflesh as beef—Difference between skeleton of horse and ox, between horseflesh and fat, and beef flesh and fat—Difference between heart, liver, kidney, and tongue of horse and ox—Meat partially decomposed through having been kept too long or ill-kept—Meat from animals which have not been killed by man or only killed when moribund—Meat from animals much injured by accidents—Meat from animals newly landed from shipboard, off a railway journey, over-driven or frightened—Meat from animals recently physicked—Meat from aged animals—Immature veal and lamb—Frozen and chilled meat.

IN describing the physical signs by which unwholesome food intended for human consumption may be detected, it is convenient to consider the examination of the articles the Public Health Act empowers sanitary officers to examine and seize under six headings, as follows :—

- (a) Animals, carcasses, and butchers' meat.
- (b) Poultry and game.
- (c) Fish.
- (d) Fruit and vegetables.
- (e) Corn, bread, and flour.
- (f) Milk.

This arrangement includes all the foods named in the statute except "flesh," which appears to be a superfluous word.

It is proposed to deal with group (a) in the present chapter, and the diseases which render meat unfit for food of man, or depreciate the quality of the meat, in the two following chapters. The remaining five groups will form the subject of the five succeeding chapters. It is proposed then to devote three chapters to the foods not mentioned in the Public Health Act, and certain foods sold cooked.

The simplest language will be used throughout, medical and scientific terms being avoided as far as possible.

Live Animals.—It does not often happen that a sanitary official is called upon to examine live animals. However, he may sometimes have to do so a short time before their slaughter. It is scarcely necessary to say that the powers given to examine and seize live animals should be used only exceptionally, and then with great caution. A healthy animal intended for human food should be well nourished, able to rise without difficulty, and to walk without lameness. Its coat should be in good condition, its skin supple, and without sores, scabs, or boils. Its eyes should be bright, its mouth and nostrils moist, but free from discharge. It should breathe easily, almost noiselessly, and its breath should be without odour. It should not shiver or give any indication of being in pain.

Carcases.—A sound, healthy carcase should be well set as soon as it is thoroughly cool; it should also be well bled, no part of it being purple, brown, or speckled. One side or quarter should not be darker than the rest. It should not be bruised or bile-stained, and not markedly attenuated. The muscle on being pressed with the fingers should not

“pit,” as this would indicate the presence of water, and should not “crackle,” as this would indicate the presence of air.

In places where carcasses are inspected, the offal also (that is, the head, feet, hide, and all the internal parts except the kidneys¹) should be submitted for inspection. The mouth and tongue should be free from blisters and blotches, the hoofs should be firmly attached to the feet, the hide should be free from sores and pimples. The lungs should be of a bright pink colour and spongy, free from cavities, pus (matter), or worms. A portion cut off should float in water. The heart should be free from bile-staining and blotches. The liver should be of a rich brown colour, should not break down easily under pressure, should be free from abscesses (collections of matter) and from flukes. The spleen, or melt, should be of a dark colour inside, grey on the outside, thin and long, and sharp at the edges. The stomachs should not be inflamed, the lining should not readily rub off, and should not smell of drugs. The bowels should have a smooth, uninflamed lining, and should be free from blotches or ulcers (surface sores).

Approximate normal weight of certain organs of animals, the flesh of which may be used for human food.—Possibly not much importance attaches to this. Still it is a kind of information a meat inspector expects to have. The averages furnished by different authorities vary somewhat, but not to any great extent. Perhaps those given by Mr J. T. Cowderoy, an inspector of much experience, are as trustworthy as any. They are as follows² :—

¹ The head, feet, and skin of a pig form part of the carcass, the offal being only the internal parts, less the kidneys.

² From page 64 of 4th Edition of *Pocket Notes and Remembrancer for Sanitary Inspectors and all engaged in Public Health Work.*

Stomach and intestines with contents	{	Fasting ox	. 146 to 244	lbs.
		Calf	. 7	„ 36 „
		Hog	. 11	„ 23 „
Heart	{	Ox	. 4	„ 6 „
		Horse	. 6	„ 10 „
		Sheep	. 1	„ $\frac{1}{2}$ „
		Hog	. 1	„ 1 „
Spleen	{	Ox	. 1	„ 2 „
		Horse	. 1	„ $1\frac{1}{2}$ „
		Sheep	. 1	„ $\frac{1}{4}$ „
		Hog	. 1	„ $\frac{1}{4}$ „
Liver	{	Ox	. 6 to 12	lbs., average 10 lbs.
		Horse, old	. 6 to 12	lbs.
		„ young	. 12	„ 16 „
		Sheep	. $\frac{3}{4}$	„ 2 „
		Hog	. 2	„ 5 „
Kidney (each)	{	Ox	. 1	„ 1 „
		Horse	. 1	„ $1\frac{1}{2}$ „
		Sheep	. $\frac{1}{8}$	„ $\frac{1}{4}$ „
		Hog	. $\frac{1}{4}$	„ $\frac{1}{2}$ „

Butchers' Meat.—Good meat is firm and elastic to the touch, moist but not wet, and, except in the case of pork, veal, and lamb, bright red in colour. It has also, if well fed, a somewhat marbled appearance from small layers of fat in the muscles. It has a fresh, not disagreeable smell.

(To test this, an iron or wooden skewer should be thrust into the centre, and rapidly withdrawn and smelt.) The meat juice should slightly redden litmus paper, showing that it is faintly acid. The fat should contain no watery juice or jelly, and should be free from bloodstains; the suet fat should be hard and ivory-white. In salt meat the brine should not be sour.

Meat not of the description represented.—Meat should be what the butcher calls it. In other words, beef

must not be the flesh of horse, mule, or ass; mutton must not be goat flesh, and lamb must not be derived from kid or dog. That goats and kids are occasionally dressed and offered for sale under another name is a well-known fact, but it is probably an exceedingly rare offence for a dog to be prepared for human food or fraudulently offered for human food. If in any case the carcass of a goat or dog were exposed for sale *whole*, the detection would be comparatively easy, as the general shape of the carcass would suggest something wrong. When merely pieces are exposed for sale, the fraud is not always easy to discern. A goat is usually thinner and has darker flesh than a sheep, and smells goaty. As for dog-flesh, the characteristic odour may be sufficient to betray it. The only fraud of this description which there is reason to believe has been extensively practised is—

The Sale of Horseflesh as Beef.—As a special Act of Parliament was lately passed to regulate the sale of horseflesh, and prevent its being sold as beef, it is important to point out how it may be recognised.

The very marked difference between many of the bones of the horse and the corresponding bones of the ox will often be sufficient to distinguish between a joint of horseflesh and a joint of beef, as may be seen by comparing the skeletons of the horse and ox in Figs. 8 and 9.

The differences are perhaps most noticeable in the bones of the head, breast-bone, the ribs, and bones of the feet. The horse has eighteen pairs of ribs, the ox only thirteen pairs. However, the skeletons of the two animals differ appreciably throughout. For this reason horseflesh is commonly boned before being offered for sale as beef. It is also well to remember that horse bones are more oily than beef bones.

Horseflesh is coarser in texture and darker in colour than

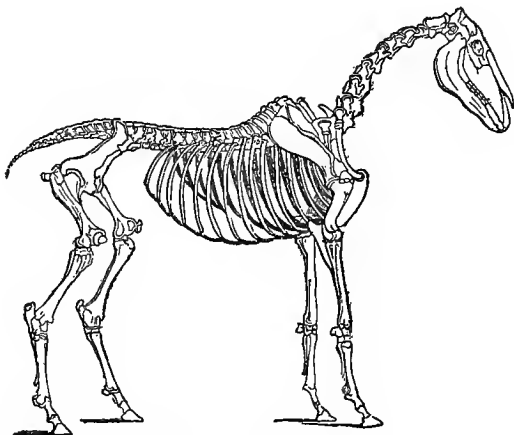


FIG. 8.—Skeleton of the horse.

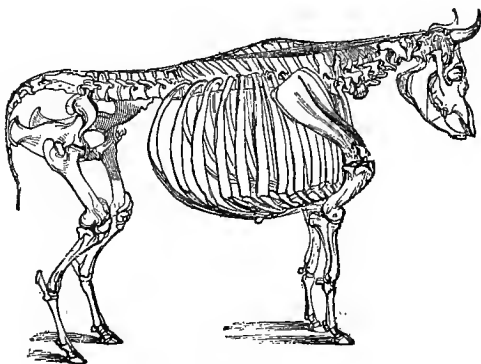


FIG. 9.—Skeleton of the ox.

beef, is without small layers of fat in the muscles, and has a characteristic odour.

Fat from the carcase of the horse is darker and softer than beef fat, and has a peculiar horsey flavour. So much more easy is it to detect horse fat than horseflesh, that it has been a practice to remove the fat from horseflesh and skewer beef fat to it, and this practice is specially forbidden in the Sale of Horseflesh, etc., Regulation Act.

The heart of the horse is at the bottom more rounded off

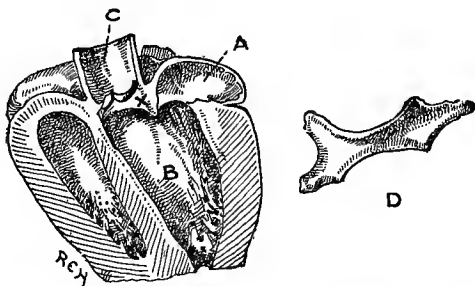


FIG. 10.—Bone of the ox's heart, and section of heart showing position of same.

than the ox's heart. The bone of the ox's heart also serves to distinguish it. Fig. 10 represents this bone of the natural size, and shows the position it occupies in the heart. The bone is due to the ossification of certain fibro-cartilaginous rings which separate the auricle (upper chamber) from the ventricle (lower chamber) in the heart of the ox. In Fig. 10, A is the auricle and B the ventricle; C is the main artery (the aorta), and D is the bone, of natural size, after removal.

If the meat inspector will pass his forefinger about two or three inches down the main artery and bend the tip slightly,

he will be able to feel the bone at the point marked X. The bone is rather deeply embedded in the muscles of the heart, but after some little experience its location can easily be determined. The fibro-cartilaginous rings are present in the hearts of all animals and in man, but only become ossified in the ox and some antelopes. It is more definite in outline and can better be located in the hearts of the older oxen, in which it is frequently two inches long.

In the heart of the horse there is cartilage in place of bone, and the horse's heart has but little fat on the surface.

The kidneys of the horse are smooth on the surface, and the right kidney is shaped a little like a cocked hat. It will be at once seen that this could not be mistaken for any other kidney, and least of all for the long lobulated kidney of the ox. Fig. 11 shows the kidney of the ox (A), the pig (B), the sheep (C), and that of the horse (D). The ox kidney, being divided into many lobes, could never be mistaken for any other. The difference between the pig's kidney and the sheep's kidney, in form, will be seen by comparing B and C. The kidney of the horse is shown in section. The capsule (*a*) is a thin investing membrane, readily stripped off in a healthy kidney. The cortical substance (*b*) comes next, and within this are the pyramids (*c*), which are darker in colour and firmer. The central cavity (*f*) is the pelvis, terminating in the ureter (*d*), through which the urine passes to the bladder. The hepatic vein is shown at *e*. In general structure and function the kidney is similar in all domesticated animals. The kidney may be affected by tubercular disease, by cysts, and (in the case of overfed animals especially) by fatty degeneration.

The liver of the horse is divided into three distinct lobes,

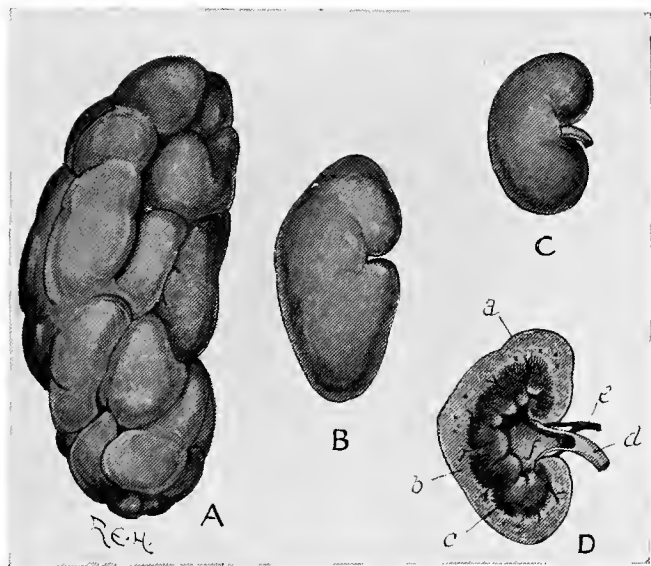


FIG. 11.—Kidney of ox, kidney of pig, kidney of sheep, and section of kidney of horse.

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and has no gall-bladder. The difference between this and the liver of the ox, as shown in Fig. 12, is well marked. The upper illustration represents the under surface of the liver

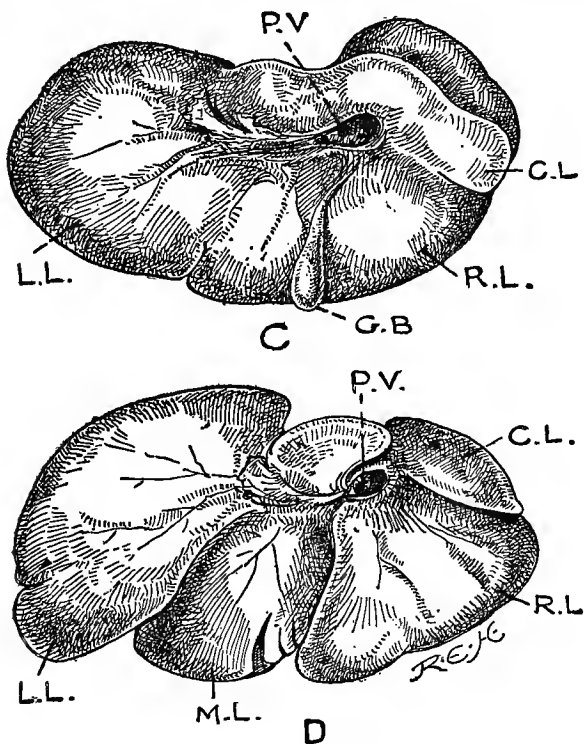


FIG. 12.—Liver of ox and liver of horse.

of the ox (C); the lower illustration represents the under surface of the liver of the horse (D). The ox gall-bladder is shown at C.B. In both livers the left lobe is marked L.L., the right lobe R.L., the caudate lobe C.L., and the

portal vein P.V. In the horse's liver the middle lobe is shown at M.L.

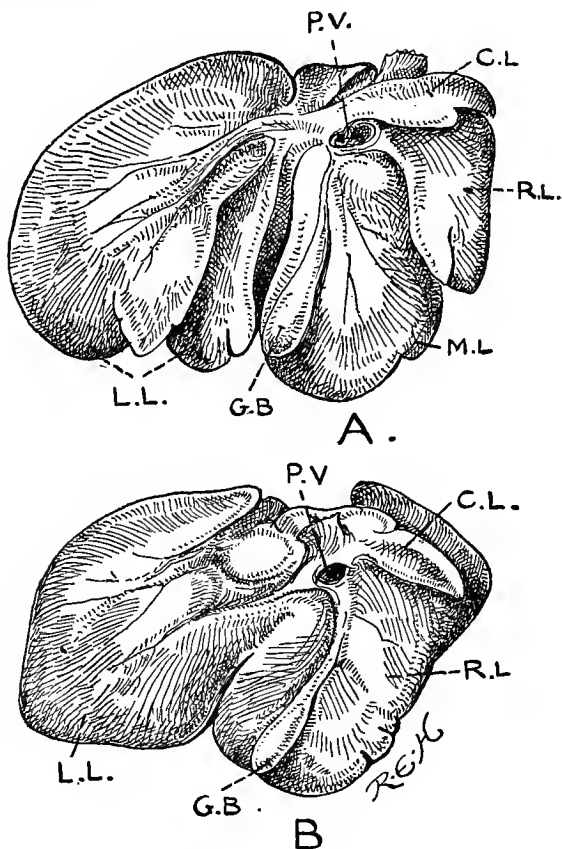


FIG. 13.—Liver of pig and liver of sheep.

The next illustration (Fig. 13) represents the livers of the

pig and the sheep, the under surface being shown in both cases. The upper illustration (A) is the liver of the pig, and the lower illustration (B) is the liver of the sheep. In both livers the left lobe is marked L.L., the right lobe R.L., and the caudate lobe C.L., the portal vein P.V., and the gall-bladder G.B.

On the principle that meat should be what the butcher calls it, it is important that the purchaser of liver should get what he asks for. The kind of liver most esteemed is from the calf, the retail value being from 7d. to 8d. per lb. The liver least esteemed is from the ox or cow, the usual retail price being from 4d. to 5d. per lb. If the livers were always exposed whole, the size would at once serve to distinguish these; but if they are exposed in cut pieces, the main difference is that calf's liver is much lighter in colour. However, in young beasts from two to three years old, the liver of a bullock or cow is often much lighter in colour. Lamb's liver, of course, sells for a higher price than sheep's liver. The former retails usually at 7d. per lb., and the latter at 6d. per lb. Pig's liver is not much in favour in this country. However, the retail price is usually 6d. per lb. In German communities it seems to be preferred, and they make a sausage from minced pig's liver only, no pork or fat or bread being mixed therewith. Lamb's liver, though not as light in colour as calf's liver, should be lighter than sheep's liver or bullock's liver. Pig's liver should be a little darker than that of other animals. When light-coloured there is a prejudice against it.

The next illustration (Fig. 14) shows the upper surface of the tongue of the horse (A), the tongue of the ox (B), and the tongue of the pig (C). This surface is specialised as an organ for the discrimination of food by the arrangement, number, and form of certain papillæ, viz. filiform papillæ

(very minute processes which give the tongue its velvety

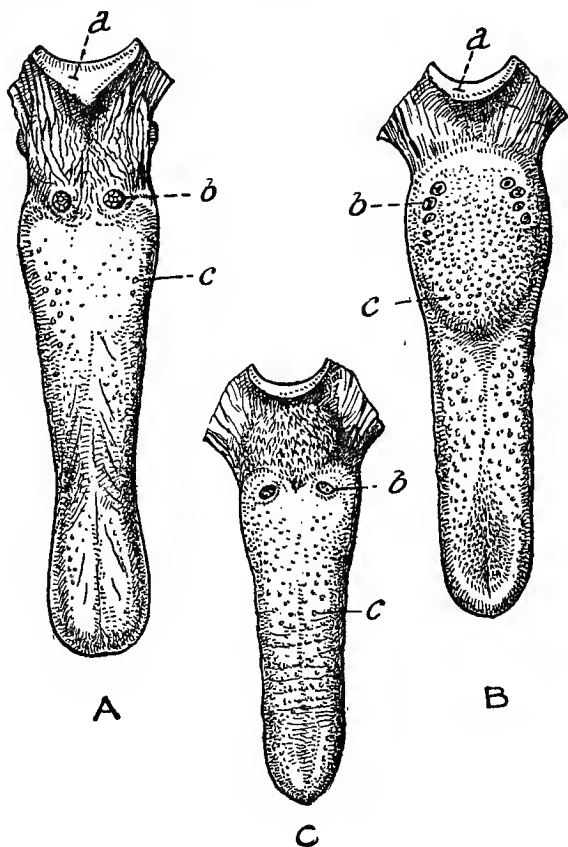


FIG. 14.—Tongue of horse, tongue of ox, and tongue of pig.

feel), fungiform papillæ (indicated at *c*), and circumvallate papillæ (indicated at *b*). To be more exact, the special

characteristics of these three tongues may be summed up as follows :—

- A. The tongue of the horse is longer, narrower, and more pliant than that of the cow, the apex is spatulate, and the medium line or “raphe” well marked. The fungiform papillæ (*c*) are more numerous along the sides and tip of the tongue. There are two well-marked circumvallate papillæ (*b*), the mucous membrane at the base is thrown into ridges or folds, and the epiglottis (*a*) is pointed.
- B. The tongue of the ox is rather thicker and firmer than that of the horse: The fungiform papillæ are more numerous, and at a space near the top become somewhat hardened and pointed. The surface of the ox tongue is altogether rougher than that of the horse; the circumvallate papillæ are in series of 2, 4, or 6; the base of the tongue is thickly studded with fungiform papillæ. The epiglottis is semicircular.
- C. The tongue of the pig is smooth, pliant, and slightly pointed at the tip. Fungiform papillæ are uniformly introduced over anterior two-thirds of the tongue; two circumvallate papillæ, which may be oval or round; the mucous membrane at the base of the tongue is thrown into numerous pointed papillæ.

It goes without saying that it is a much simpler matter to distinguish between horse tongue and ox tongue when fresh than after salting.

Meat partially decomposed through having been kept too long, or ill-kept.—Meat actually putrid would, of course, never be offered for sale; but checking the sale of meat beginning to decompose will ordinarily occupy a large share of the food inspector's time and attention. Partial decomposition is known mainly by the characteristic

odour. The meat, too, loses its elasticity, is soft, and tears readily. * On cutting, the resistance offered to the knife varies, some parts being softer than others. The cut surface often swells, from a kind of fermentation or "heating." The outside is pale and livid, at a later stage greenish; or the outside may be dark-coloured, hard, and dry. Litmus paper is not reddened, but remains neutral, or indicates the juices are alkaline.

Meat from animals which have not been killed by man, or only killed when moribund, is dark in colour, often purple. The meat sets badly, is full of blood, neutral or alkaline, and readily decomposes. The flaying and dressing of such animals are usually done under unfavourable circumstances, and often by no expert hands, so that the carcase looks hacked, bloodstained, and untidy.

Meat from animals much injured by accident.—Animals smothered or drowned, or struck by lightning, come under the heading of animals not killed by man, and should certainly be seized as unfit for human food. But there may be submitted for inspection carcases of animals which have been overlain in a railway truck or ship's hold, and yet not smothered; or carcases of animals injured by immersion in water, and yet not drowned; or even carcases injured by lightning, and yet not struck dead. In such cases it is often a nice point to decide whether the meat should pass. Much depends on the appearance of the carcase after it has had twelve hours to set. The carcase of an animal so nearly suffocated, or so injured by lightning, that it bleeds ill, and is full of venous blood (black blood), should not pass. An animal nearly drowned is injured in the same way as an animal nearly smothered. The meat is sodden and ill-bled, and keeps badly.

Carcases of animals which have been nearly choked

resemble in many respects carcasses of animals nearly smothered. When the animal has struggled long before being killed, and the meat is ill-bled and ill-set, it is not wholesome.

Animals hoven, or blown, if not given effectual relief, may get into such a state that when killed the appearance of the carcass is similar to that of a smothered or choked animal.

Another way in which meat may be injured is by being badly bruised. Imported animals suffered much from bruising before the introduction of modern cattle-carrying ships. Now animals are often landed in prime condition after a long, stormy voyage. The bruised portions are not fit for human food, and should be cut away. Sometimes the bruising is so extensive that the only course is to condemn the whole carcass. Sometimes bones are fractured, and the flesh is torn and bruised from within by the sharp ends of the broken bones. If, as sometimes happens when a cow breaks its leg in trying to leap a gate, the animal is at once skilfully killed and dressed, the whole carcass except the part immediately round the fracture may pass; but after a few days' delay swelling and inflammation will spoil a quarter of the carcass, and further delay may render the whole carcass unfit for human food.

Meat from animals newly landed from shipboard, off a railway journey, over-driven, or frightened is almost certainly deteriorated. No animal should be slaughtered when in a tired, nervous, or irritated condition. After a sea voyage or railway journey a day or two for rest should be allowed; after a journey by road, not less than a day's rest. When an animal has been over-driven or badly frightened it suffers from a kind of nervous fever, and several days' quiet and careful feeding may be required to

restore it to a healthy condition. An animal shot or felled in a mad panic is often quite unfit for human food.

Meat from animals slaughtered in ill-arranged slaughter-houses in sight of one another.—Whether animals do or do not suffer from fear when slaughtered in sight of one another has been much debated, and that they do has not been absolutely proved ; but there is no doubt that cattle, especially, frequently show great reluctance to enter the slaughter-chamber, and can only be dragged in by the employment of considerable force. The presumption is that what they chiefly object to is the smell of blood. Whether this be so or not, it is obviously undesirable from a purely business standpoint to run any risk, as it appears to be an established fact that the flesh of an animal killed whilst in a state of fear or excitement loses some of its palatable and marketable qualities.

In connection with this subject, it may be well to notice a circular of the Local Government Board on "The Humane Slaughtering of Animals," lately addressed by the Secretary to councils of boroughs and urban and rural districts, which is dated March 20th, 1908. The opening passages are as follows :—

"I am directed by the Local Government Board to state that they have recently had under consideration the question of the slaughtering of animals in slaughter-houses, in connection with the Report¹ of the Committee appointed by the Admiralty upon the subject of the Humane Slaughtering of Animals, and they think it may be desirable to draw the attention of the Council to the subject, and especially to certain recommendations made by that Committee as to methods of slaughter. Under the terms of the reference the investigations by the Committee related

¹ Parliamentary Paper [Cd. 2150], 1904.

to the following animals, viz. cattle, calves, sheep, lambs, and pigs.

“The Committee suggested the universal enforcement of the following regulations :—

- ‘(a) All animals, without exception, must be stunned, or otherwise rendered unconscious, before blood is drawn ;
- ‘(b) Animals awaiting slaughter must be so placed that they cannot see into the slaughter-house, and the doors of the latter must be kept closed whilst slaughtering is going on ;
- ‘(c) The drainage of the slaughter-house must be so arranged that no blood or other refuse can flow out within sight or smell of animals awaiting slaughter, and no such refuse shall be deposited in proximity to the waiting-pens ;
- ‘(d) If more animals than one are being slaughtered in one slaughter-house at the same time, they must not be within view of each other ;
- ‘(e) None but licensed men shall be employed in or about slaughter-houses.’

“Many urban district councils, and some rural district councils possessing the necessary powers, have, under the provisions of the Public Health Act, 1875, made a byelaw for preventing cruelty in slaughter-houses. This byelaw is usually based on one of the Board’s Model Byelaws, which provides :—

- ‘Every occupier of a slaughter-house and every servant of such occupier and every other person employed upon the premises in the slaughtering of cattle shall, before proceeding to slaughter any bull, ox, cow, heifer, or steer, cause the head of such animal to be securely fastened so as to enable such animal

to be felled with as little pain or suffering as practicable, and shall in the process of slaughtering any animal use such instruments and appliances and adopt such method of slaughtering and otherwise take such precautions as may be requisite to secure the infliction of as little pain or suffering as practicable.'"

Meat from animals recently physicked may be rendered less palatable and wholesome, but should not be condemned merely on this account. The smell of drugs in the stomach will put the inspector on his guard, and may lead to the discovery of circumstances respecting the animals which have been concealed. Meat highly tainted with the smell of drugs is, of course, deteriorated in quality.

Meat of aged animals is often of very poor quality, being tough and coarse and stringy. Such meat, however, is not, merely on account of age, unfit for human food. As cows sometimes go on calving till they are eighteen or twenty years of age, an old cow sent to the meat market may be very old indeed. Such carcasses are frequently much emaciated. The carcasses of old bulls sent to the meat market are not so old, and generally in better condition. Prime beef should be from oxen not exceeding five or six years of age—the best is usually three or four years old. The diagrams herewith submitted of the ox's front teeth will enable the inspector of a live animal to make a fair estimate of its age, by a careful examination of its front teeth.

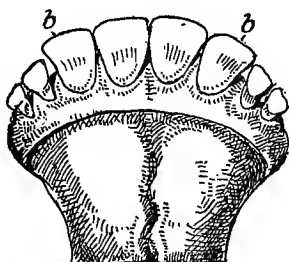
In the adult ox there are eight incisors or cutting teeth in the lower jaw only; their eruption (or cutting through the gums) varies considerably in the different breeds of cattle. In the Moland shorthorn, Hereford, and other breeds which come to maturity early, the teeth are more forward than those of the Northern, Western, and Irish breeds. In the former the calves frequently show the central incisors just through at birth.



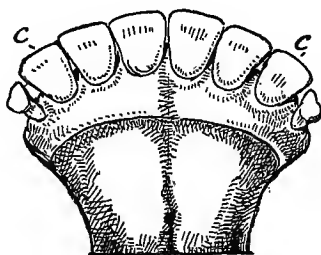
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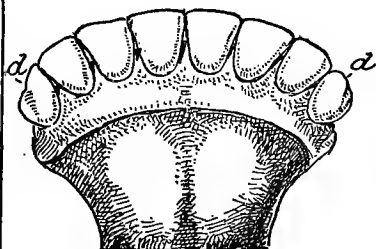
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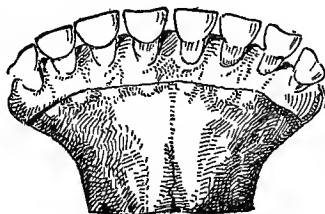
C



D



E



F

R.E.H.

FIG. 15.—Front teeth of ox, showing age of animal.

In Fig. 15:—

A shows the incisors of the calf, from a month to the completion of the first year.

B shows the incisors of an animal when 1 year and 9 months old, and from that to 2 years. The central pair of incisors (*a a*) are well grown.

C shows the incisors when the animal's age is from 2 years 6 months to 2 years 10 months. The central and medium (*b b*) incisors are well up.

D shows the appearance of the teeth when the animal is from 3 years 9 months to 4 years. The lateral incisors (*c c*) are well up, and the central incisors show a little wear.

E shows the appearance of the teeth when the animal is $4\frac{1}{2}$ to 5 years old. The outer incisors (*d d*) are well up, and the permanent series are well grown and should be even, a good colour, and smooth in the front.

F shows the appearance of the teeth in an animal 7 or 8 years old. All the teeth, it will be observed, show signs of wearing down. The cutting edge is thick, and becomes "square-cut" or hollow. As age advances they show distinct signs of thinness, and eventually fall out.

As sheep are not used for milking in this country, aged ewes are not ordinarily seen at the meat market. Rams of good age are not uncommon, and make poor-quality mutton. A ram is distinguished from a wether by its thick neck, strong shoulders, and thighs. Ram mutton is coarse in fibre, and has sometimes an unpleasant colour.

Immature Veal and Lamb.—It is generally held that immature veal and lamb are unwholesome, though it would perhaps be difficult to say on what grounds. Certainly what

is called "slink" meat, calves or lambs cast prematurely, or dying during birth, should be seized ; but there can be little justification for seizing as unwholesome the carcass of an animal merely because it was killed before completing its third or fourth week, or some age arbitrarily fixed upon. Ordinarily, if the feet have hardened somewhat, and the black, slimy contents of the intestines at birth are purged off, as they will be in about forty-eight hours, the carcass may pass.

Frozen and Chilled Meat.—As live cattle imported from infected areas and landed at a foreign animals' wharf have to be killed within fourteen days, the carcasses are often stored in chill rooms for longer or shorter periods. Large consignments of meat from America, Australia, and New Zealand are also imported into this country in a frozen condition. The appearance of frozen meat is therefore quite familiar to the trade, the public, and the inspector. The quality of meat is usually excellent, and much is doubtless thawed, trimmed, and sold as prime home-grown meat. This is certainly a fraud, but it is no part of the inspector's duty to attempt the almost impossible task of proving it. American-killed carcasses are known through being bruised about the legs, by which they are hoisted previous to slaughter. Note also that the fat of all imported frozen meat is apt to be more or less coloured with red serum.

Through defects in the arrangements for transit, perfectly sound meat may arrive nearly covered with blue mould. Similarly, through being carelessly stored on arrival, the surface may be allowed to grow moist and tainted while the carcass remains sound. It is also true that frozen meat which looks very well on the surface may be a little "gone" near the bone in the centre. Thus no examination of frozen meat is quite satisfactory unless the carcass or piece be cut through.

CHAPTER V

THE DISEASES OF ANIMALS WHICH RENDER MEAT UNFIT FOR HUMAN FOOD

Cattle-plague, or rinderpest—Epizöotic pleuro-pneumonia—Anthrax and anthracoid diseases—Black-quarter—Splenic fever—Braxy in sheep—Texan fever—Sheep-pox—Consumption (tuberculosis) in swine—Actinomycosis—Joint-ill or joint-felon—Swine-plague, swine-fever, and erysipelas—Quinsy in swine—Worms affecting swine—Cysticerci and trichinæ—Glanders and farcy.

DETERMINING whether meat is sound or decomposing, whether it is well bled or has the blood in it, and whether it is old and tough or in prime condition, are comparatively simple matters, and not beyond the intelligence of most housewives; but judging whether meat is from a diseased animal, the nature of the disease, and whether it affords warrant for seizing the meat, will tax the inspector's capacity to the full.

What, then, are the diseases ordinarily met with, or likely to occur, in home-bred or imported animals, which should be regarded as rendering the meat unfit for the food of man?

In **oxen and sheep**: Cattle-plague, epizöotic pleuro-pneumonia, anthrax and anthracoid diseases, sheep-pox, actinomycosis, and joint-ill or rheumatism.

In swine: Swine-plague, swine-fever, and erysipelas, epizöotic pleuro-pneumonia, anthrax or anthracoid diseases, quinsy, consumption (tuberculosis), and two diseases known by the presence of parasitic worms, cysticerci and trichinæ.

In horses: Glanders and farcy.

Besides these there are other diseases which depreciate the quality of the meat, render portions of the carcase unfit for food of man, or in their later stages, unfit the whole carcase for food of man. These will be dealt with in the next chapter.

Cattle-plague, or Rinderpest, is essentially a disease of oxen. The flesh is not changed in appearance except in an advanced stage of the disease, when the meat is dark and has a disagreeable smell, and sometimes crackles on pressure, owing to the presence of air. Quite early in the disease the lining of the intestines and air-passages is reddened. The inside of the intestines is covered with a blood-coloured, glairy fluid. Later there is a yellow cheesy deposit in the throat and nostrils, and dark-coloured blood-patches on the intestines and heart. There is commonly an eruption on the back, loins, and inside of thighs, which may be seen if the hide is produced. In the cow the eruption may appear on the udder.

The symptoms most likely to attract attention to an animal affected with this disease, during life, are a glairy discharge from the eyes, nose, and mouth, drooping of the ears, shivering, and purging.

Fortunately cattle-plague is of rare occurrence. It is forty-one years since it visited this country.

Epizöotic Pleuro-pneumonia, otherwise called lung-plague, is of far more importance as a disease of oxen than of sheep or swine. The only thing noticeable about the meat is that it usually looks dark and ill-bled. The blood

is dark from imperfect action of the lungs. The lining of the chest will probably be thickened and roughened, and also the covering membrane of the lungs. The principal changes are in the lungs themselves. Early in the disease the lobules are red, or brown, or grey, surrounded by thick yellow bands of fibrous lymph. The lungs are swelled, but less spongy, and a glairy liquid exudes from the cut surface. Later the lungs grow solid, like liver. At this stage the lungs will sink in water, and the weight is much increased—from 7 or 8 lbs. to 30 lbs. or more. When the disease is limited to a few inches of lung the carcase is, of course, unchanged in appearance.

The most obvious symptoms in the live animal are the laboured breathing, arched back, husky cough, shivering, and evidence of pain. In the later stages the breath is very offensive. There is often a large quantity of water in the chest, quite sufficient to distend it to an extent certain to attract notice.

In the pig, besides the change in colour and density of the lungs, the intestines are often inflamed and marked with dull patches, and parts of the skin are reddened, especially under the belly.

It may be well here to introduce an illustration showing the normal appearance of a healthy lung. If the inspector will bear this in mind, he will be in a better position to judge of the changes effected by disease.

As indicated in Fig. 16, every portion of the lung is filled up by the ramification of the bronchial tubes (B), which are continuations of the trachea or windpipe (A), and by the arteries and veins of the vascular system (C, D). The bronchial tubes end in the bronchioles (G) and air-cells, which are invested by the minute capillaries of the blood-vessels (H, I). The lungs are covered by a thin membrane,

the pleura (F), through which can be discerned the irregular-shaped "lobules" (E).

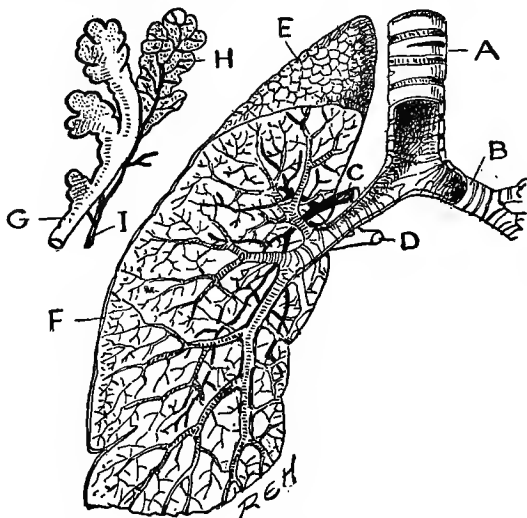


FIG. 16.—Normal appearance of healthy lung.

Anthrax.—There are three forms of anthrax and anthrax-like disease. In one, probably the least common, large boils are the most obvious symptom, and will be recognised without difficulty. In another form of the disease, called *black-quarter* or black-leg, one of the fore quarters or hind quarters is dark in colour, and more or less swelled. This, also, is easily recognised. Although the disease appears to be restricted to one quarter, the whole carcase should be seized. A third form of the disease is *splenic fever*. The meat is darker than it should be, and the whole carcase is bile-stained. The liver is nearly always enlarged and somewhat softened, and the lungs are generally inflamed. But the

most characteristic symptom is the enlargement of the spleen, the increase in an ox being from about 3 lbs. to 7 lbs. or 10 lbs. Note, also, the rounded edges of a spleen thus affected. The meat is often dropsical, and water is frequently poured out between the lobes of fat in which the kidneys are embedded. In any form of the disease the blood is often dark and quite fluid, and there are discoloured patches from extravasated blood in several organs and in the flesh, as well as escaped blood (sometimes in quantity) in the cavity of the intestines.¹

An ox or sheep affected with the disease is dull and very thirsty, often sore to the touch, and breathes uneasily. If it has black-quarter it will be lame, and the swelled part may crackle on pressure. Sometimes splenic fever takes the form of apoplexy, and the animal may fall down and die almost without warning. What is called *braxy* in sheep is splenic apoplexy. The meat is remarkably dark and sometimes dropsical, and the spleen is increased in weight from 2 or 3 oz. to 5 or 6 oz., or more. When attacked the sheep staggers, stretches out its head, and breathes rapidly.

The pig is certainly not very susceptible to anthrax, but the disease may be produced experimentally, and now and again occurs as an outbreak.

The carcase of a pig affected with anthracic disease is livid or red over much of the surface, and the meat is sodden and darker in colour. There may be dark or blood-

¹ The leaflet issued by the Board of Agriculture on Anthrax, states:—
“It is important that it should be widely known that the disease is solely due to the introduction into the blood of an animal or of man, of the minute spores or germs contained within the anthrax bacilli, which are to be found in the blood of animals recently dead of anthrax so soon as it is exposed to the air. On the other hand, the bacilli of anthrax and the spores therein die speedily if kept within the intact carcase.”

coloured blotches on the intestines or heart. The spleen is enlarged, as in the case of the ox and sheep. The disease may affect the pig as apoplexy.

Apparently allied to splenic fever is a disease known as *Texan fever*, so called from its having widely affected Texan cattle. Many years since (in August 1880) several oxen landed at Birkenhead from America, which were believed by the local authority to be suffering from this disease, were destroyed as unfit for human food. The carcasses were ill-bled and bile-stained, and the spleens much enlarged (in some cases weighing over 9 lbs.), dark in colour, and broken-down in structure. Ulcers (surface sores) were also found in the fourth stomach. On the mucous membrane lining the intestines were patches of congestion and escaped blood. In many cases there was enlargement of the liver, and some inflammation of the lower part of the large gut (the rectum). The carcasses were in a fair condition as to flesh and fat, but the fat was in parts blood-stained.

Sheep-pox is a disease not often seen in animals submitted for inspection. The eruption, when first it comes out, resembles flea-bites. These become solid pimples, in which a clear fluid soon forms, and then the fluid changes into pus. The pustules are larger than in the human disease, and may sometimes run together. The eruption may appear in the mouth. In the lung may be found collections of matter. The wool comes off readily. In the early stage the disease might not be recognised, spots like flea-bites being the only obvious symptom. Later the flesh becomes soft, pale, and dropsical. After pus has been formed, there can be no mistaking the disease. Except in the early stage of sheep-pox, the meat has a disagreeable odour.

Consumption (tuberculosis) is a disease affecting a large proportion of the oxen and cows in this and other

countries, a small proportion of swine, and occasionally calves. Very rarely sheep (three or less in 100,000) are affected. Ever since it has been known that tuberculosis in the lower animals is certainly the same disease as in the human subject, the question has been much debated whether, given an animal that is the subject of tuberculosis, every portion of its carcase is dangerous to anyone eating it, or whether there are many cases of what has been called localised tuberculosis, in which the flesh may with safety be sold as food for man. The opinion expressed on this subject in the Report of the last Royal Commission on Tuberculosis, dated April 4th, 1898, has received official sanction and approval, inasmuch as it is quoted in circular letters of the Local Government Board to Councils of Boroughs, and Urban and Rural Districts, bearing date March 11th, 1899. The Board state that they think Councils should direct their officers, employed as meat inspectors, to act in accordance with the principles laid down. The rule laid down as regards cattle will be referred to in the next chapter. It amounts to this, that when the disease is confined to certain parts or organs, the carcase, if otherwise healthy, shall not be condemned. However, as regards swine, the opinion expressed is as follows :—

“In view of the greater tendency to generalisation of tuberculosis in the pig, we consider that the presence of tubercular deposit in any degree should involve seizure of the whole carcase and of the organs.”

The meat inspector is therefore officially instructed to regard tuberculosis in swine as a disease of animals which renders the meat unfit for human food, and tuberculosis in oxen and cows as a disease of animals which ordinarily renders portions only of the carcase unfit for human food, though in its later stages it may unfit the whole carcase for human food.

The disease in swine may be manifested in the intestinal glands or in the lungs, which is practically another way of saying that the tubercle bacillus may obtain access to the animal with the food it eats, or with the air it breathes. It has been estimated that in nine out of ten cases the pig is infected through the alimentary canal, and it has been observed that very young pigs are chiefly attacked. It is thought that the infecting food is mainly tuberculous milk. Deposits are commonly found in many glands. The disease is exceptionally liable to attack the tonsils and cause ulceration. The liver and spleen are often badly affected. Deposits also occasionally occur in the muscles. Tuberculosis of the lung may be miliary (deposits of the size of millet seeds being scattered all through the lungs), or the less acute form of the malady, where the deposits are not so numerous, but each deposit is larger and more distinct. Broken-down deposits are rarely seen, owing to the fact that the pig is commonly slaughtered before this stage of the disease is reached.

Actinomycosis is, like tuberculosis, a disease communicable from animals to man, and occasionally so closely resembles tuberculosis that it may be mistaken for it. The disease manifests its presence in the form of tumours, ulcerations, and abscesses in various parts of the body, especially the head and neck. It is not a new disease, but one which has only recently been understood. The growths characteristic of the disease, according to their gross appearances, have been called wens, polypi, cancer of tongue, lung tubercle, bone tubercle, lumpy jaw, etc. ; but the nature of this disease is indicated by the presence of a vegetable micro-parasite—the ray fungus. Inside the mouth the disease appears as nodules, wart-like growths, or ulcers, and attacks both upper and lower jaws, especially

where there are bad teeth. The disease may appear in the nasal cavities, the gullet and windpipe, and lungs. The wens (or tumours in or just under the skin) may grow to a great size or break down early and discharge their contents. The tumour, when cut, has a honeycombed appearance, the bands of tissue forming a spongy structure, in which are the fungus tufts and yellowish pus.

Fig. 17 illustrates the external appearance of an ox or

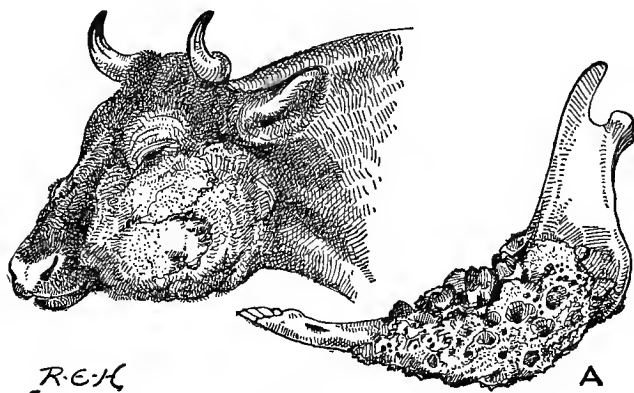


FIG. 17.—Head of ox affected with lumpy jaw, and half lower jaw of same.

cow whose lower jaw is affected with this disease. The left half of the lower jaw (A) is also shown. The extent of the mischief done is obvious. The teeth in the diseased portion are useless, and in time fall out. Mastication is of course impossible, and the animal becomes debilitated and soon falls off in condition.

On the whole, actinomycosis is a less serious disease than tuberculosis; but, inasmuch as it is a disease common to man and oxen, and affects so many parts of the body, a

carcase infected by it should not be regarded as fit for the food of man.

The Board of Live Stock Commissioners for the State of Illinois now enforce the destruction of all animals affected with actinomycosis, and prohibit the use of the carcasses for human consumption. In New York, also, and in most of the States of America, the utilisation as human food of carcasses infected with this disease, even in a slight degree, is not tolerated.

At a conference of the Inter-State Live Stock Sanitary Association, held some years since, the following resolution was passed :—"That it is the sense of this conference that animals affected with actinomycosis should be destroyed, and that the carcasses thereof should not be used for human food."

Joint-ill or Joint-felon.—Animals affected with this disease, which is probably always rheumatism, will commonly attract attention by their lameness or their inability to rise. The joint or joints affected contain a clear fluid ; sometimes there is pus in or around diseased joints. Abscesses (collections of pus) may form at some distance from the joints attacked. The meat is often dropsical. If the animal has been unable to get up for some time, the side on which he lay will look red and inflamed.

Erysipelas in Swine.—There is no doubt that swine are liable to erysipelas, though till lately it has been commonly mistaken for other diseases, and passed by other names. The skin, and often the mucous membranes, are disfigured with livid or brown patches from engorged blood-vessels and escaped blood. The flesh is pearly and softer than it should be ; the glands of the intestines are swollen ; the lungs are more or less inflamed, and the liver and spleen are usually enlarged. If the disease has existed for some time there is emaciation and dropsy.

During life the symptoms likely to attract attention are loss of appetite, red patches on skin, and reddening of the eyes. Rarely pustules form, or even ulcers. There is constipation at first, later there may be diarrhoea, and towards the end convulsions.

Swine-fever.—There appears to be a form of swine-fever which may be mistaken for erysipelas, or for the disease generally termed swine-fever in this country. The carcase of an animal thus affected will show brownish-red patches on the skin, inflammation of the lungs, some inflammation of the intestines, and enlargement of the spleen.

In life the animal has red patches on the skin, is thirsty, but will not eat; is weak, breathes quickly, has a cough, and usually convulsions.

Swine-plague, or Swine-fever, or Typhoid Fever, known also as swine-typhus and pneumo-enteritis, and in America as hog-cholera, does not necessarily produce any marked changes in the meat. The skin, however, rarely escapes affording some indication of disease. There is general or patchy redness (red soldier), or there are large livid blotches (blue disease), or there is an eruption resembling small-pox, pus being secreted and crusts forming as in human small-pox. In cases where the pig is "soldiered," the redness is not limited to the skin, but the fat beneath is reddened right down to the flesh. The intestines are often inflamed and marked with red spots, and characteristic ulcers appear in the large gut (chitterlings), and less frequently in the small gut. These vary in size from mere points to three-quarters of an inch across. In the ulcers ochre-coloured crusts form, convex or cup-shaped, and these in time fall out. The appearance of a group of these ulcers, in the large intestine of a pig, is well shown in Fig. 18. In each ulcer the crust is well formed and

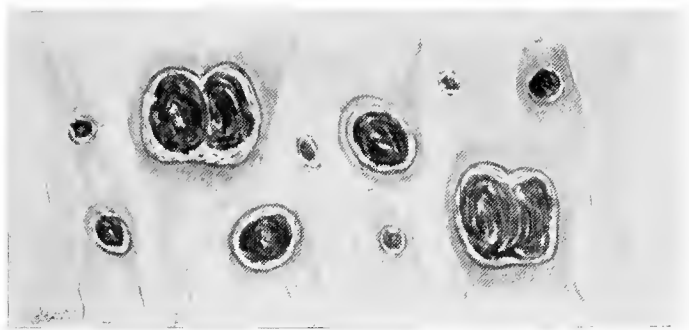


FIG. 18. —A group of ulcers (containing well-formed crusts) in the large intestine of an animal suffering from swine fever.

To face page 106.

still adheres. The lungs are commonly congested, and may be in part solidified. These are the main symptoms, but there may be intestinal ulcers without lung disease, and with little discoloration of the skin; and, on the other hand, there may be a very pronounced skin eruption, and scarcely any traces of the disease elsewhere. Butchers sometimes rub salt along the edges of the reddened fat to remove the colour, but an edge so treated can be easily removed with a knife. Of course, when the skin eruption is so marked as to resemble bad small-pox, it is not probable that the carcase would be brought into the market.

In life the main symptoms of this disease are the skin eruption, constipation, followed by diarrhoea, and the difficult breathing or coughing. From the first there is much thirst, loss of appetite, hanging of the ears, and often some shivering.

Quinsy in Swine, known also as "strangles," is characterised by swelling in the neck and sore throat. The swelling may extend into the fore-quarters. The throat is dropsical, and sometimes part of the inside mortifies. The skin round the throat will be red or livid, and there may be an eruption in the mouth. The main symptoms during life are the swelling, laboured breathing, and the refusing of food.

Worms affecting Swine.—Of the two kinds of worms to be looked for in pork, the larger, *cysticerci*, are much more common and easily detected. They look like little bladders of water, and occur in the flesh between the fibres, and often on the surface. The bladder is egg-shaped, and generally from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch in length. Specimens from the same animal usually vary in size but slightly. The bladder is semi-transparent, containing a clear fluid, and what looks like a little grey or white ball. Transfer one of the bladders to a slip of glass, prick it with the point of a knife, and press another piece of glass on the top.

Examine this with an ordinary pocket lens, and observe the head or sucker of the *cysticercus*.

Pork affected with this parasite is popularly known as "measly pork," owing to the curious appearance of the flesh on section. Quite young pigs may manifest the disease; indeed, they are probably specially susceptible. When pork is a little dry from exposure to air, the bladders may shrink so as to be hardly seen. In such a case a small portion should be soaked in water. The salt in salted pork tends also to dry up the bladders. The danger of eating measly pork is that any *cysticercus*

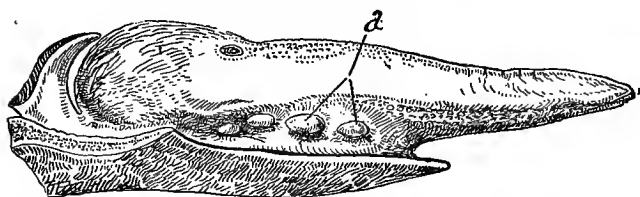


FIG. 19.—Side view of pig's tongue, showing bladders (*cysticerci*) under it.

reaching the intestines of the human subject is liable to develop into a tape-worm. In examining a live pig to see if it be measled, search should be made beneath the tongue, when often the little bladders can be felt or seen. The bladders may also be found in the loose folds under the tail. Swine affected with this disease are often swelled round the shoulders, but commonly there is no marked external sign indicative of the disease.

A common position of these little bladders being under the pig's tongue, the next illustration (Fig. 19) shows the side of such a tongue, with several bladders (*a*) clearly indicated thereunder.

The "head" expressed from one of the bladders (*cysticercus cellulosæ*) when ruptured is depicted in Fig. 20. The suckers are shown distinctly as they should be. Frequently they are not so clear, the cysticercus having undergone degenerative changes, caseous or calcareous.

The head of the *tænia solium*, the tape-worm of man, is shown for comparison in Fig. 21. The suckers are as in the last illustration, but it has also a circlet of hooks for



FIG. 20.—"Head" expressed from a little bladder or cyst in measly pork.

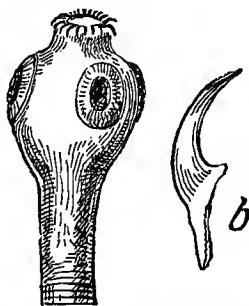


FIG. 21.—Head of *tænia solium*, human tape-worm, showing circlets of hooks, and one of the hooks drawn to a much larger scale.

fastening to the human intestine. To see a head thus plainly a good lens must be used.

The second kind of worm infecting pork, *trichinæ*, can be seen on close inspection. The meat looks speckled. The little white specks soon come out clearer if a very thin shaving of the pork be placed on a glass slip and soaked for a short time in a weak solution of caustic potash. The bladder or shell containing the worm is not placed between the flesh fibres, but actually in a fibre, causing a lemon-shaped swelling. If the glass slip be held up to the

light, and examined with a powerful pocket lens, the coiled-up worm, fine as a hair, will be seen. If the inspecting officer has access to a microscope, of course this (using a $\frac{1}{8}$ objective) will define the parasite better. Sometimes the white specks feel gritty from the presence of carbonate of lime, etc. *Vide* Fig. 22, showing the coiled-up trichinæ in

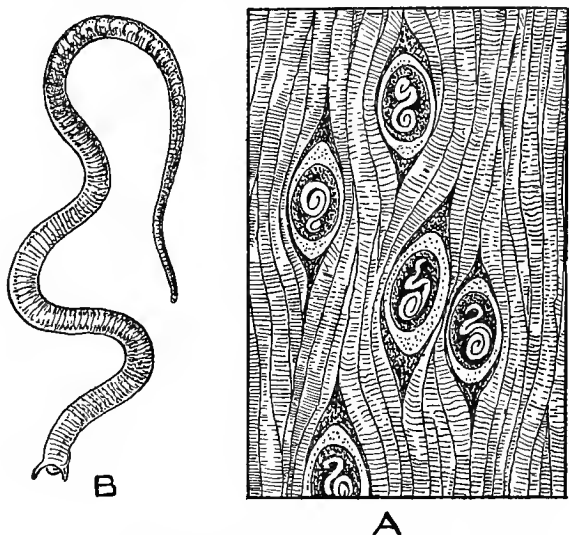


FIG. 22.—Trichinæ in the muscular fibres of pork, and the male worm much magnified.

the muscular fibres (A), and the male worm (B), much magnified.

The length of the male worm is 1.6 mm., and the length of the female is about 3 to 4 mm.

The danger of eating pork infested with trichinæ is that the little worms become active and find their way into the flesh of the human subject.

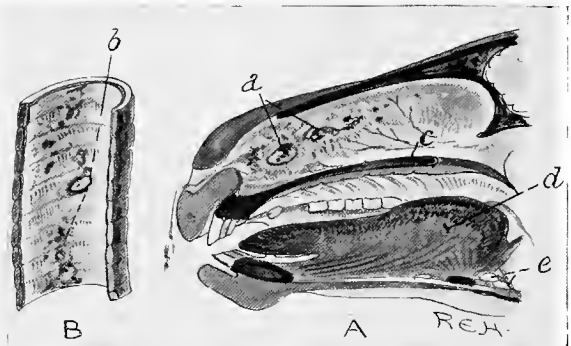


FIG. 23. —Glanders in the horse, mouth and nose in section, and portion of windpipe.

Swine affected with this disease may present no noticeable symptoms during life. To test them, a morsel of flesh is sometimes removed from under the tongue, and a section examined with a lens.

Glanders and Farcy.—As horseflesh may be lawfully sold for human food, any meat inspector may find a stall or stalls for the sale of horseflesh in his district. It will then be his duty to see that the meat therein exposed for sale is not affected so as to be unfit for human food. The only diseases ordinarily met with or likely to occur in the horse which certainly render the carcase unfit for human food are glanders and farcy. Both diseases (if they be regarded as two, for essentially they are but different forms of the same disease, due to the same bacillus) are certainly communicable from the living horse to man, and the flesh of an infected animal could not be eaten without risk. Glanders is characterised by a profuse mucous discharge from the nostrils, ulceration of the nasal mucous membrane, enlargement of the glands under the jaw, and inflammation of the lungs. In the lungs are often little nodules, and sometimes abscesses. Farcy is characterised by an irruption of what have been called farcy "buds," swellings the size of a marble, which burst, leaving inflamed open sores. Sometimes a limb is swelled, or more than one, apparently from obstruction of the lymphatic vessels. In both glanders and farcy the flesh may be poor, lighter in colour, and watery, but occasionally it looks perfectly healthy.

Fig. 23 illustrates appearances in a horse affected with glanders. In A is shown the mouth and nose in section. Glanderous patches or ulcers are marked *a*, the hard palate is marked *c*, the tongue is marked *d*, and the glands at base of tongue are marked *e*. B is a portion of the wind-pipe showing glanderous ulcers (*b*).

CHAPTER VI.

THE DISEASES OF ANIMALS WHICH DEPRECIATE THE QUALITY OF THE MEAT, RENDER PORTIONS OF THE CARCASE UNFIT FOR HUMAN FOOD, OR IN THEIR LATER STAGES UNFIT THE WHOLE CARCASE FOR HUMAN FOOD

Consumption (tuberculosis) in oxen and sheep—Foot-and-mouth disease — Warbles— Hoof-rot — Dropsy — Liver-fluke — Filaria — Sheep-scab — “Diamonds”— Heart diseases— Wooden tongue — Bladder-worms — Tape-worms — Coccidiosis of Liver—Anomalies of the Blood—Carcases of parturient animals— Milk-fever — Parturient fever—Carcases of poisoned animals.

THE diseases which do not necessarily render the carcasses of animals affected unfit for human food, but depreciate the quality of the meat, and render portions, and occasionally the whole, unfit for human food, will be briefly dealt with in this chapter. Till lately it was commonly held that four diseases, ordinarily met with or likely to occur, come under this description—viz. foot-and-mouth disease hoof-rot, dropsy, and liver-fluke. To these must now be added consumption (tuberculosis) in ruminants. Foot-and-mouth disease affects swine almost as extensively as sheep or oxen.

Liver-fluke is mainly a sheep disease, and hoof-rot almost entirely so. After a description of these diseases, and a word or two on so-called "diamonds," the parturient state and the diseases incidental thereto will be considered. In the concluding paragraph reference will be made to the carcasses of poisoned animals.

Consumption (tuberculosis), called also pearl disease, or, among butchers and dealers, "the grapes," is a common disease of oxen (especially of milch cows), and very rarely affects sheep. There is a note on the disease in swine in the previous chapter. In bovine tuberculosis the little rounded tumours, or "pearls," hardly seen when commencing, but growing to the size of a pigeon's egg or larger, occur mainly on or near the surface of the lungs, and on the walls of the chest. Butchers, when dressing a carcase, commonly remove the pearls from the chest walls, removing also a large portion of the lining membrane, which the careful inspector will not fail to remark.

Sometimes throughout the substance of the lungs are deposits of the disease, and the glands about the neck, or the glands in connection with the intestines or elsewhere, are enlarged and contain deposits. On cutting open one of the pearls, its contents are found to be thick cheesy matter, either of the same consistency throughout, or the centre may be softened or gritty. The cheesy matter is cream-coloured or yellowish. The lung tissue may be perfectly normal in appearance, or congested or partly consolidated. Sometimes tubercles, too small to be called pearls, are scattered through the lungs, and these are occasionally very hard. Sometimes abscesses (collections of matter) are found in the lungs. There may be deposits of tubercle or abscesses in the liver, and in almost any part of the body.

The frontispiece of this book is a coloured drawing illustrating tuberculosis in cattle. It shows the external surface of a portion of the lung, the interior of the lung when cut through, one of the larger glands in a state of disease, and, for comparison, a similar gland when healthy.

Opposite this page is another coloured drawing illustrating tuberculosis in cattle. It shows—

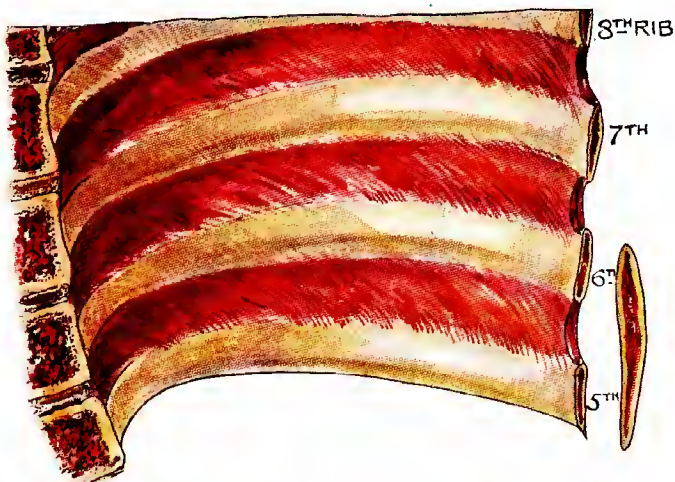
1. The internal surface of a portion of healthy ribs of beef, and a section of a healthy rib.
2. The internal surface of a similar portion of diseased ribs of beef, and a section of a diseased rib.

Fig. 24 represents one side of a carcase of beef affected with tubercle in the abdominal cavity and thorax. At A the tubercular deposits on the lining membrane of the chest are well marked; B is the diaphragm (midriff), on which also are tubercular deposits; and C is the abdomen, the lining of which is also tuberculous. The position is indicated at D.

Fig. 25 shows the position of the more important lymphatic glands in one side of a carcase of beef. A cervical gland is shown at A. B is the sternum (breast-bone), and underneath it are the sternal glands, marked C. D is the diaphragm. E shows the inguinal glands. F indicates the position of the pelvis. G are the deep inguinal glands. The lumbar glands are marked H, and the kidney glands I. Thoracic glands are marked J.

Fig. 26 shows the appearance of miliary tubercle in the liver of an ox. This is not uncommon. A great number of hardened yellowish nodules are apparent on the surface, and on section it is found that similar nodules are distributed more or less abundantly in the substance of the liver.

When the disease is of old standing there are usually distinct cavities in the lungs, and wasting and dropsy.



HEALTHY AND TUBERCULOUS BEEF.

Internal surface of portion of healthy ribs of beef, and section of healthy rib.
 Internal surface of similar portion of diseased ribs of beef and section of diseased rib.

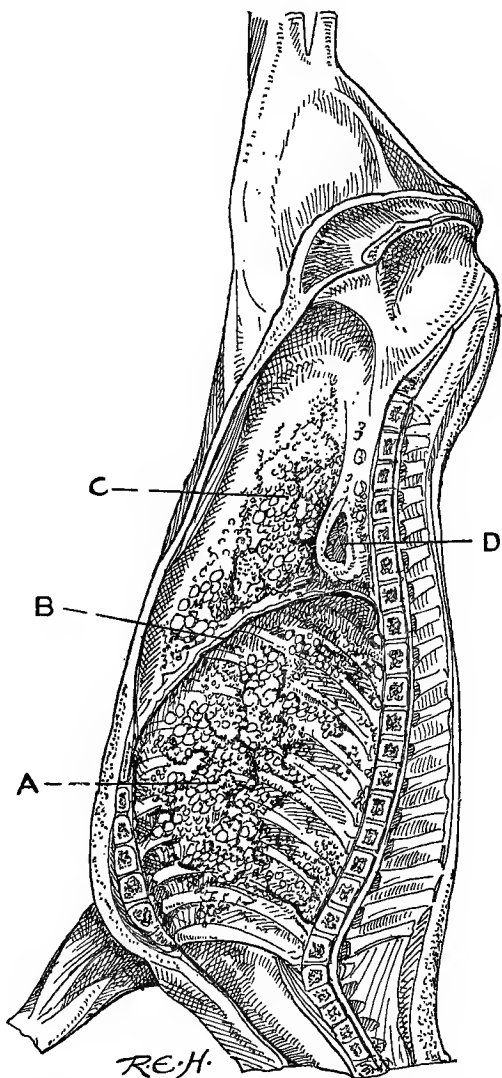


FIG. 24.—Tubercular disease in the abdominal cavity and thorax of ox.

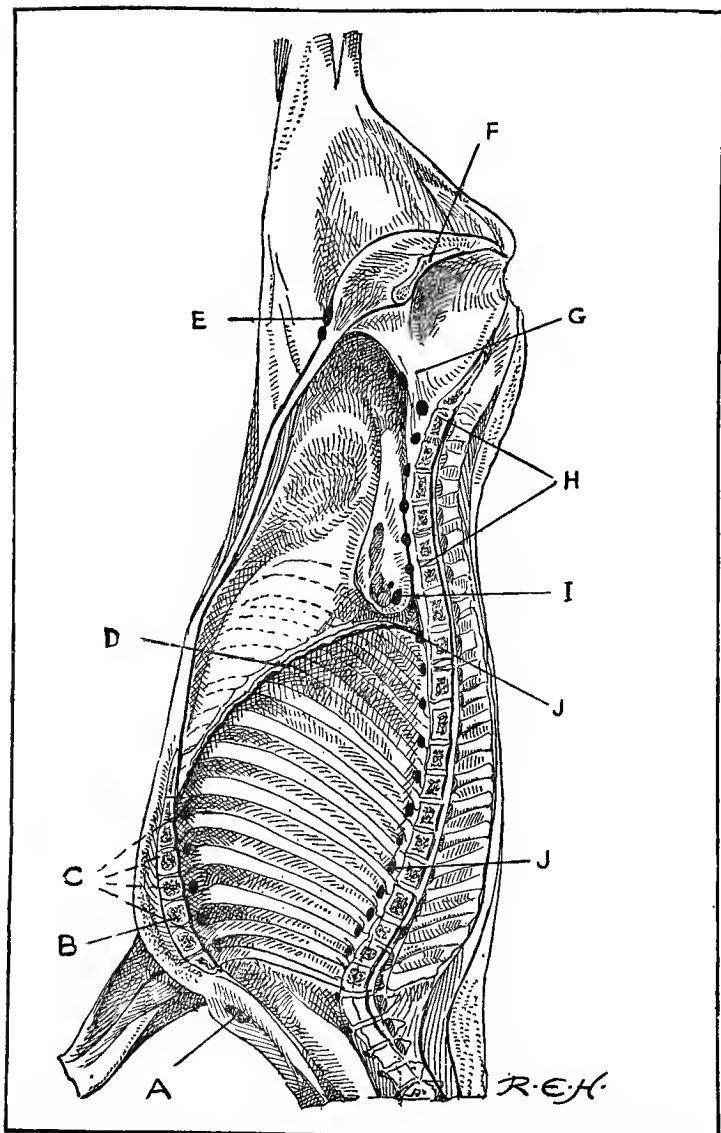


FIG. 25.—Half a carcass of beef, showing the position of the more important lymphatic glands.

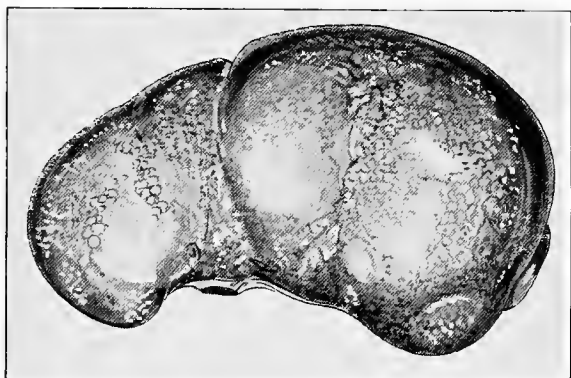


FIG. 26.—Ox liver affected with miliary tubercle.

To face page 116.

In life there are often no certain signs to indicate that an animal is suffering from this disease. The animal probably has a cough, but this is not necessarily due to consumption, and there may be no appreciable loss of condition.

There has been much discussion as to whether the carcasses of all animals infected with tuberculosis should be held as unfit for human food. That tuberculosis is a disease communicable from one of the lower animals to man is an established scientific fact; nor will it be denied that the disease is communicable in various ways—*e.g.*, by breathing infected air, by swallowing infected food, or by having infected matter introduced into the blood. How, then, can the meat of an infected animal be eaten with safety?

The disease is now known to be caused by a minute organism called the bacillus of tubercle, and this is readily carried from one part of the body to another by the blood, or by the lymphatic stream. Still, the most recent deliverances on the subject are opposed to the seizure of every infected carcase.

The Local Government Board, in circular letters to Councils of Boroughs and Urban and Rural Districts, dated March 11th, 1899, issue the following¹:—

“Instructions to Meat Inspectors with regard to Tuberculosis in Animals intended for Food.”

“The Royal Commission recommended that the Board should be empowered to issue instructions from time to time for the guidance of meat inspectors, prescribing the

¹ In another circular letter, dated September 6th, 1901, the Board draw attention to their circular letter of March 11th, 1899, and strongly urge the Councils addressed to direct those of their officers who are employed as meat inspectors to act in accordance with the principles laid down by the Royal Commission.

degree of tubercular disease which, in the opinion of the Board, should cause a carcase, or part thereof, to be seized.

“Pending the issue of such instructions, we are of opinion that the following principles should be observed in the inspection of tuberculous carcases of cattle :

- | | |
|--|--|
| “(a) When there is miliary tuberculo-
sis of both lungs | } The entire car-
case and all the
organs may be
seized. |
| “(b) When tuberculous lesions are
present on the pleura and
peritoneum | |
| “(c) When tuberculous lesions are
present in the muscular system
or in the lymphatic glands em-
bedded in or between the
muscles | |
| “(d) When tuberculous lesions exist in
any part of an emaciated carcase | |
| “(a) When the lesions are confined
to the lungs and the thoracic
lymphatic glands | } The carcase, if
otherwise healthy,
shall not be con-
demned, but every
part of it contain-
ing tuberculous
lesions shall be
seized. |
| “(b) When the lesions are confined
to the liver | |
| “(c) When the lesions are confined
to the pharyngeal lymphatic
glands | |
| “(d) When the lesions are confined
to any combination of the fore-
going, but are collectively small
in extent | |

“In respect of foreign dead meat, seizure shall ensue in every case where the pleura have been ‘stripped.’”

The Board do not consider it necessary at present that

anything should be added to these instructions, or that they should be modified, and the Board think that the Council should direct those of their officers who are employed as meat inspectors to act in accordance with the principles thus laid down.

Foot-and-Mouth Disease.—The eruption in foot-and-mouth disease appears on the tongue and in the mouth, sometimes extending into the throat and nostrils, and round the foot just above the hoof and in the cleft. In cows and ewes and sows it commonly appears on the teats and around them. The eruption consists of blisters, like those produced by scalding water, usually very small at first, but increasing, it may be, to the size of half an egg. Often the blisters run together.

Blisters inside the mouth, as a rule, are soon burst by the tongue, leaving bare red spots, which sometimes become sores, like small ulcers. After the external blisters dry up, crusts form. Round the feet the contents of the blisters burrow between the soft part and the hoof. The hoof may be loosened or shed. Occasionally (especially in sheep) no regular blisters occur on the feet, but the skin becomes red and swollen, and exudes a thick gummy fluid. The mouth may be badly affected, and little or no disease in the feet, or *vice versa*. The flesh, even if minutely examined, cannot be distinguished from the flesh of perfectly healthy animals. Ordinarily there is no objection to passing it; but the head, feet, and udder should be seized. When the eruption has extended into the intestines, producing a condition resembling typhoid fever, as is not infrequent with calves suckled from a diseased udder, or when the local symptoms are so severe as to produce much inflammation of the surrounding parts and abscesses, the carcase should, of course, be condemned.

In examining animals before slaughter, note if there is

any discharge from the mouth, and examine mouth, feet, and udder. When the feet are affected the animal is lame, or paws the ground, or lies. The state of the mouth makes feeding slow and painful. If the disease has existed some time, the falling-off in condition is very marked.

Warbles appears to be the popular name given to the swellings produced by the gad-fly of the ox. This disease is most common in the late summer. The fly pierces the

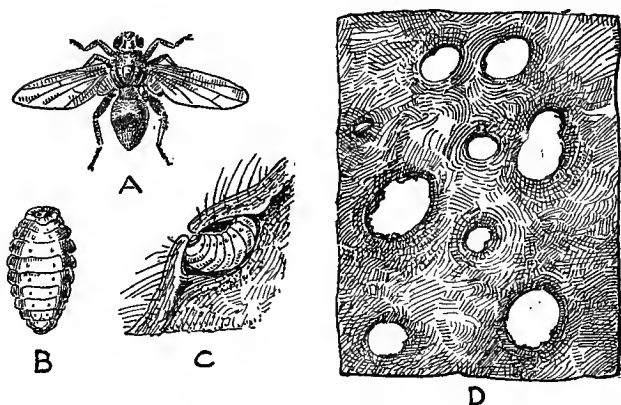


FIG. 27.—The ox warble fly, showing the mature insect, the maggot, etc., and a portion of the ox-hide with many perforations.

skin and deposits the ovum, with a drop of acrid fluid, in the subcutaneous tissue. This gives rise to a small abscess, in which the larva is found; in course of time the abscess bursts, and an open sore is formed. This surface sore does not usually affect the meat, but where the animal is much "warbled" the carcass is certainly damaged. The fat round the spot affected is wanting in firmness, and tinged greenish yellow.

Fig. 27 shows the adult fly (A), which is a little over half

an inch in length. The body is black, white, and yellow. In May and June the female deposits vast numbers of eggs, mainly in the skin of the shoulders and back ; a maggot (B) develops and bores under the skin, and so becomes encysted as at C. Lumps are felt where the pupa is situated, and in due course the mature fly emerges. When the animal is slaughtered the skin is found to be perforated in many places, as shown at D.

Hoof-rot, which is not an uncommon disease amongst

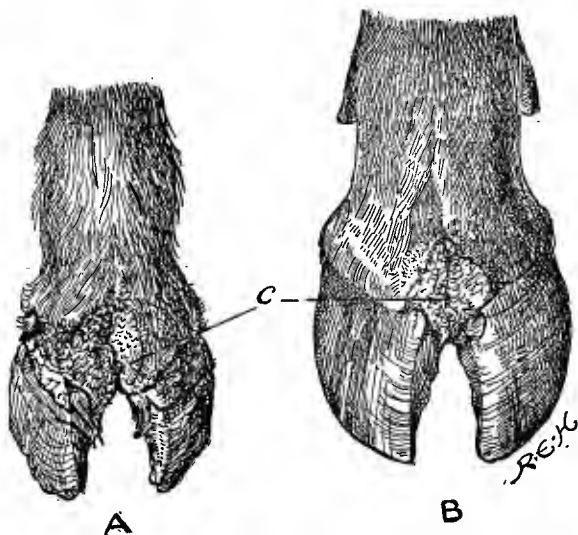


FIG. 28.—Hoof-rot in the sheep and in the ox.

sheep, may in some cases be mistaken for foot-and-mouth disease. It consists in inflammation of the soft parts of the foot, and may lead to shedding of the hoof, or even to diseases of the bones of the foot. Usually a thick, cheesy matter collects over the affected skin ; sometimes blisters

or pimples may be seen. The flesh looks wholesome, and is so. Except in rare instances, when the inflammation extends into the carcase, all may be passed except the feet. An animal affected with the disease is lame, and loses condition.

The illustration (Fig. 28) shows the appearance of hoof-rot affecting a sheep (A), and less advanced disease affecting an ox (B). Often the disease commences at the interdigital sebaceous gland, marked *c*. An open sore forms, yielding a purulent discharge. The more common form of the disease seems to be associated with pasturing animals on wet, swampy ground. The tissues at the base of the hoof become softened, resulting occasionally in the sloughing of the hoof. Through the sore thus formed decomposing matter is absorbed, causing an inflammatory condition of the parts contiguous. The disease is no doubt contagious.

Dropsy is not, properly speaking, a disease, but a symptom of many diseases. It may be due to disease of the heart, liver, or kidneys, and to other causes. Sometimes the water is limited to the chest or abdomen, and in such cases it does not warrant the condemning of the carcase. When, however, the water is poured out into the muscles and between them, making the flesh sodden and wet, the carcase may be seized as unwholesome. Such meat keeps badly, and has occasionally a faint urinous smell.

Liver-fluke.—The most widespread of sheep diseases due to parasites is that popularly known as the "rot." The cause of the disease is the presence in the liver bile-ducts of flukes—little animals in shape like a sole (Fig. 29).

Though flukes are not infrequently found in oxen, they do not occur ordinarily in such numbers as to produce serious disease. The fluke is furnished with a sucker by

which it attaches itself. This parasite, when once seen, will always be recognised. It usually measures from an inch to an inch and a half in length, and is about three-eighths of an inch wide. Flukes are often so closely packed in the bile-ducts as to block them up, and the pressure produced causes the ducts to stretch or burst, portions of the liver being broken down or destroyed. The symptoms of the

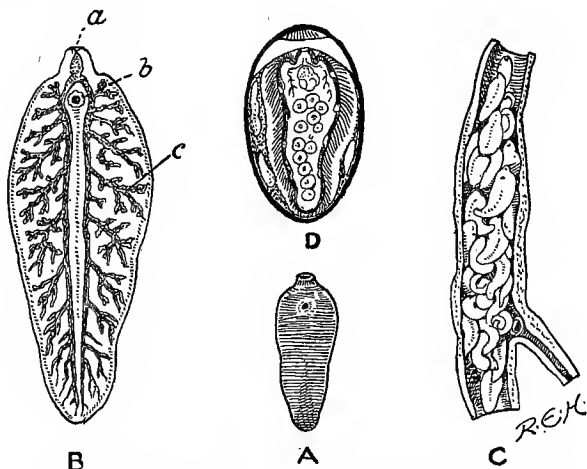


FIG. 29.—Liver-fluke of sheep, and fluke-egg, with portion of bile-duct distended by number of flukes packed in it.

disease presented by the carcase are jaundice (bile-staining), dropsy, and emaciation. These three indications that the carcase is really "rotted" undoubtedly warrant its seizure as unsound; but the presence of a few flukes in the liver does not of itself prejudice the carcase, and affords no sufficient reason for seizing it. Even in cases where there is some jaundice and falling-off in condition, the carcase may pass. When seen alive, it will be noticed that the animal

is sluggish in its movements, yellow in the eyes, is thin, or swelled with dropsy, and its wool easily comes out.

At Fig. 29 this parasitic disease is adequately illustrated, so that the inspector will be able to identify it without difficulty. At A the liver fluke is shown rather below the usual size. At B it is seen considerably magnified. The mouth is indicated at *a*, the ventral sucker at *b*, and the branched digestive canal at *c*. At C is shown a portion of a bile-duct distended by a number of flukes packed into it. The passage of a duct is in this manner entirely closed. At D is a magnified representation of the fluke egg, with the ciliated embryo therein.

It is well here to mention several diseases of comparatively minor importance, evidence of which the meat inspector will have before him from time to time. The order in which these are taken is of no consequence. Indeed, no scientific order in maladies so diverse seems practicable.

Filaria.—This is the name of a small worm from half an inch to three inches in length (a genus of the Nematoid



FIG. 30.—Filaria in great numbers in windpipe of sheep.

Entozoa), which is occasionally found in the lungs of sheep and oxen. It soon affects the breathing of the animal,



FIG. 32.—“Diamonds” in pig.

To face page 125.

and inflammation of the lungs often results therefrom. Ordinarily no serious disease follows, and the meat of the carcase is not injuriously affected. The worms are shown in Fig. 30 at the foot of the windpipe.

Sheep Scab.—The common and fatal disease, *sheep scab*, a parasitic disease of the skin, allied to the itch in the human subject, usually occasions so much irritation that the affected

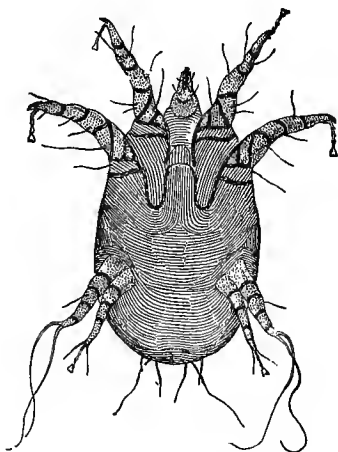


FIG. 31.—Sheep-scab insect.

sheep falls off in condition rapidly. A representation of the sheep scab insect, much magnified, is given in Fig. 31.

Diamonds.—This disease, which goes by various names, being sometimes called “nettle-rash” and sometimes “simple fever,” is ordinarily not serious from the meat inspector’s point of view. The carcase of a pig marked with this disease is shown in Fig. 32. Some inflammation of the lungs and patches of inflammation of the mucous

membrane of the intestines not uncommonly accompany this disease. From time to time the carcase of a pig is seized marked with more or less perfect red or dusky squares, measuring an inch or two either way. They are disposed irregularly over the surface, and sometimes one square, as it were, overlaps another. These marks may be few or numerous, and vary much in distinctness in the same carcase. Sometimes the squares are accompanied by rounded patches of dusky red. Such a carcase is said to be affected with "diamonds," and is commonly regarded as unfit for human food on this account. It has been described as "a blood disease," and "worse than tubercle," but no one seems to have a clear idea of the nature of the malady. The writer, many years ago, thinking it might be a skin eruption due to parasites, made sections of the squares and rounded patches, and examined them under a microscope. No parasites were found; the marks appeared to be simply bruise marks. Probably the best advice that can be given about "diamonds" is to take little account of it, but to judge the carcase affected on its merits. "Diamonds" is not long coming out, for a pig looking well over night may be freely marked in the morning, and a little indigestion or slight cold is said to be sufficient to produce the symptoms. Seeing the marks, the inspector will naturally make a more than usually careful examination of the carcase; but if the carcase looks well and has bled well, and the fat is white and firm, neither the "diamonds" nor a little reddening of the stomach lining will justify the seizure of the meat.

Heart Diseases.—Diseases of the heart, or of the heart-bag (pericardium) in which the heart works, are not uncommon in animals used for the food of man. Such disease in an acute stage ordinarily warrants the inspector

in seizing the heart as unfit for human food. As the heart is usually sold entire, disease only indicated by internal lesion commonly escapes notice. Two forms of endocarditis (inflammation of the lining membrane of the heart) are not uncommon. One is indicated by wart-like excrescences on the endocardium, especially over the valves ;

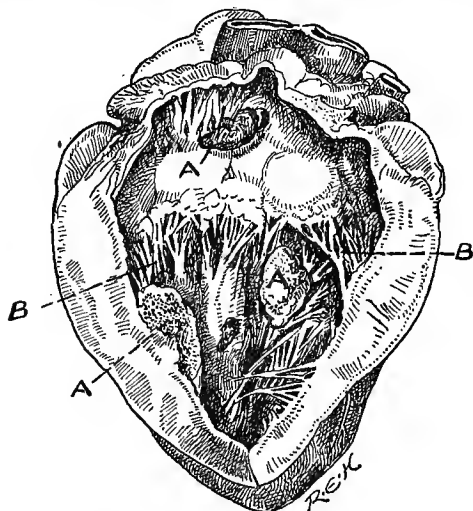


FIG. 33.—Endocarditis in heart of ox.

and in the other (thrombic endocarditis) dark-coloured clots of blood may be seen as indicated in Fig. 33 at A, A, A. These affect the free movement of the tendinous cords (B, B). Such clots of blood may become detached, leaving ulcers in the position they previously occupied. In this way the disease known as pyæmia may be commenced.

Wooden Tongue.—Under this name is a fairly common parasitic disease, which affects the tongue of the

ox. The tongue loses its flexibility and soon becomes unnaturally hard throughout, the animal thus having some difficulty in retaining its food during mastication. Upon pressure and manipulation by the hand a "lumpy" con-

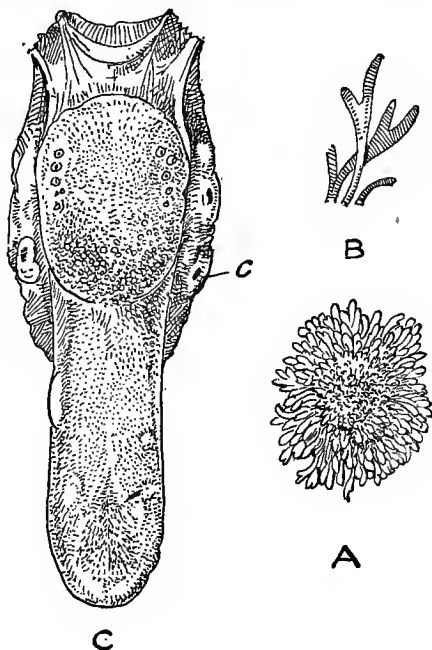


FIG. 34.—Wooden tongue, "ray fungus."

dition is to be noticed, more especially at the base of the tongue and sub-lingual muscles and glands. This is due to the presence of colonies of a micro-organism known as the "ray fungus." In the illustration (Fig. 34), A represents the fungus itself, greatly magnified, and B two of the fronds, as seen under a more powerful magnifier. C indicates the

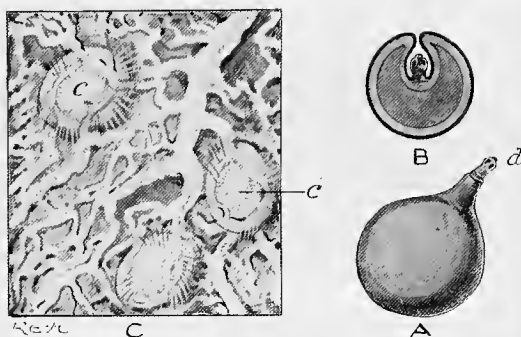


FIG. 35. — Bladder worm (*Cysticercus tenuicollis*).

upper surface of the tongue, and shows swellings resulting from the disease. At *c* one of the swellings has burst and discharged its contents. In acute cases the tongue is often much discoloured.¹

Bladder - worms. — The name “bladder-worm” has been given to more than one form of encysted parasites, which if eaten by another animal may develop into a tape-worm. The one which forms the subject of the adjoining illustration (Fig. 35) is the *Cysticercus tenuicollis*, which is frequently found in sheep, pigs, and cattle. It is the larval condition of the *Tænia marginata* of the dog. The vesicles indicating the disease vary much in size, being sometimes a little larger than a pea, and sometimes as big as a cricket-ball. They contain a clear “watery fluid.” This larval tape-worm is most frequently found under the serous lining of the abdomen (peritoneum), and less frequently under the serous lining of the chest. Perhaps the most common location of the parasite is in the omentum and liver. The illustration C represents a portion of the omentum with embedded cysts marked *c*. Upon carefully slitting the in-

¹ Though this disease is not infrequently seen by veterinary surgeons and butchers, it is very exceptional in man. However, cases in the human subject do occur from time to time. For example, in June 1908 an inquest was held in Sheffield on the body of a woman who appeared to have died from some sort of poisoning. Dr Carter, who made a post-mortem examination of the body, gave evidence that the disease from which the deceased suffered, and which was the cause of death, was one of very great rarity. The “ray fungus” had formed a tumour in the body, which was as large as a cocoanut. The actual cause of death was the bursting of this tumour, which set up peritonitis. In reply to the coroner’s inquiry as to how the disease had arisen, Dr Carter said the “ray fungus” must have been swallowed. It was generally found in connection with uncooked barley, wheat, etc. It was a vegetable parasite which grew very rapidly in the body. A verdict was returned accordingly.

vesting membrane, a thin-walled bladder, A, is found, at one side of which is the head (*a*), armed with a circlet of hooks. This bladder is shown at an earlier stage at B. The shape is quite round, and the head cannot be seen from the outside, the head being well within the bladder. Except when they exist in very considerable numbers, they appear to cause no inconvenience to the animal, nor apparently do they affect its general health. Of course the portion of the viscera actually affected should be seized and destroyed. It is interesting to note that in the liver the parasite is never much larger than a pea. Occasionally the presence of the cysts may cause peritonitis or pleuritis in young animals, when they occur in great numbers.

Another bladder-worm (*Cysticercus bovis*) is the larva of *Tænia saginata*, a tape-worm affecting man.

Tape-worms.—Three species of *Tænia* are known to inhabit the intestines of the ox. By far the most common is the *Tænia expansa* (A). The length varies much, ranging from two feet to ten feet or thereabouts. The head, marked *a*, is at the narrow end of the worm. The shape of the head is shown much magnified at *b*. It is bulbous and provided with four suckers, each having a slit-like opening, by which it adheres to the intestine. The segments *e*, or joints, are always broader than long, and at the outer border of each segment can be seen the small genital pore. Twelve species of *Tænia* are known to inhabit the intestines of the sheep, of which *Tænia expansa* is the best known. The intermediate or cystic stages of these *Tænia* is not known. At B is represented an entire tape-worm, sometimes found in the intestines of the horse. It is known as *Tænia perfoliata*. Its length is usually about an inch, and smaller ones are not uncommon. The presence of tape-worm in

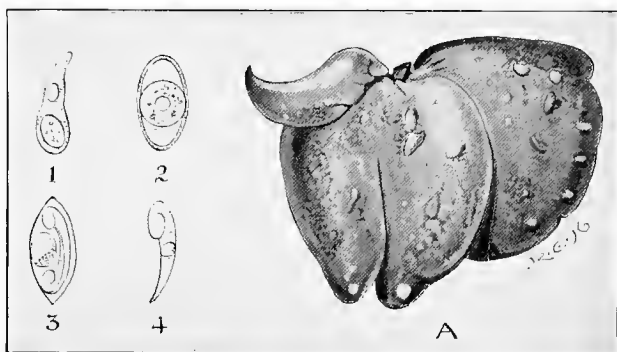


FIG. 37.—Coccidiosis of liver.

To face page 131.

the intestines, it is needless to say, does not in any way affect the carcase of an animal. However, as the numerous

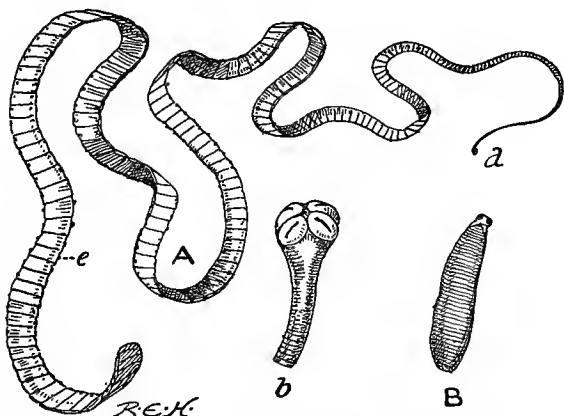


FIG. 36.—Tape-worm from sheep, and tape-worm from ox.

segments contain large quantities of ova, it is well that any tape-worms noticed should at once be destroyed.

Coccidiosis of the Liver.—The parasite giving name to this disease infests the epithelium lining the biliary ducts in the liver. Fig. 37 shows the appearance of the disease on the surface of the liver of a rabbit, at A. In the same illustration the gradual development of the parasite is shown. At first there is an elongated body, marked 1, containing a nucleus. This develops through several stages, as indicated at 2, 3, and 4. As a consequence the normal structure of the liver undergoes pathological changes, rendering it quite unfit for food. Only a moderate form of the disease is shown at A. In acute cases the liver is enlarged and very many more cysts are seen.

The same parasitic disease affects the liver of swine. The

tubercles on the liver, often no larger than a pea, tend to grow larger, and may be as big as a walnut. The walls are often thick and hard, and the liver substance round is compressed and hardened. Occasionally the whole liver is permeated with the disease, cavities extending in many directions.

Anomalies of the Blood.—The blood of food-animals is liable to certain changes in condition, which it is not wise to pass unnoticed. The more important are:—Deficiency of blood (anæmia) or poverty of blood (oligæmia), increase of the water in the blood (hydræmia), increase of the number of white blood corpuscles (leukæmia), blood poisoned by the presence of much bile (cholæmia), and increase of uric acid in the blood (uræmia). Deficiency of blood (that is, a decrease in the normal quantity) may be due to various circumstances—for example, to the animal having been fattened too much, as in swine, by unusual loss of substance, by defective nutrition, or by frequent hæmorrhages. Increase of the water in the blood usually follows upon acute anæmia. The two chief symptoms are marked emaciation and some amount of general dropsy. Increase in the number of white blood corpuscles soon makes the blood obviously less red in colour, and weakens the animal affected. Peculiar alterations of the solid tissues accompany the anomalous condition of the blood. The spleen is considerably enlarged and the surface is lighter in colour. Blood poisoned by the presence of much bile is due to the liver failing to abstract the bile from the blood as it should. The chief symptom is a staining of many of the tissues of the body, ordinarily called jaundice. Increase of uric acid in the blood may be due to defective excretion (that is, the kidneys failing to act properly) or by the reabsorption of excreted urine.

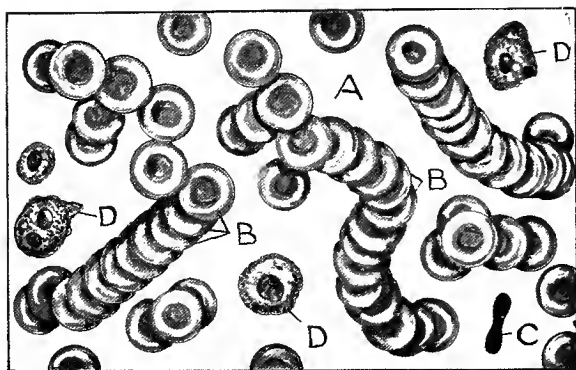


FIG. 38 —Microscopical appearance of blood.

To face page 133.

The following illustration (Fig. 38) may assist the inspector in understanding the above paragraph. It indicates the microscopical appearance of the blood. In the fluid part of the blood, A are the red blood corpuscles, which tend to run together in roughly formed rouleaux. The red corpuscles are flattened circular cells, bi-concave like a diminishing glass. They are indicated at B. One is shown cut across at C. The fluid part of the blood also has other solid bodies floating in it, and known as white corpuscles or leucocytes. The three shown are marked D, D, D. These are less regular in form and somewhat granular. In each is a nucleus, or more than one.

Carcases of Parturient Animals.—Carcases of animals which have been slaughtered immediately before, during, or after calving or lambing, are frequently submitted for inspection. There is certainly no reason for condemning these indiscriminately. If there are indications of apoplexy (the carcase dark in colour and ill-bled) or bad milk-fever (the carcase ill-set, the meat pale or livid, and wet to the touch), it is safe to make the seizure.

When, however, the slaughtering is due to some complication in connection with calving or lambing, the case is different. An animal may be killed on account of uncontrollable bleeding during or after delivery, because the calf has got jammed and cannot be extricated, or even because the calf-bed has come down and cannot be retained in position, etc., etc. In such and similar casualties there is nothing necessarily to prejudice the meat, and usually if the animal has been properly killed and bled it may be passed.

Milk-fever, above referred to, does not necessarily render the carcase of the animal affected unfit for food, but may do so. Everything depends upon the appearance of the carcase, which will be satisfactory if the animal has

been slaughtered early. The practice as regards seizure from this cause varies much. A main objection to the meat when the animal is badly affected before killing is that the meat seems soured, and keeps badly.

Parturient Fever.—Whether there be a parturient fever of a non-malignant character seems doubtful. Parturient apoplexy, and the fever due to blood-poisoning and allied to anthrax, are both sufficient to warrant the condemnation of the carcass. They are rapidly fatal, and the carcass affected will not even look marketable.

Carcasses of Poisoned Animals.—Flesh manifesting no indications of disease may be unwholesome owing to the animal from which it was derived having been poisoned. If the poison actually caused death, or if the animal was killed when in a dying state, the carcass would be ill-bled and ill-set, and attract the attention of the inspector. However, even if this were not the case, there would almost certainly be some inflammation of the stomachs and intestines, indicated by general redness and red spots. The stomachs, especially the first stomach, should be carefully searched for traces of bryony, meadow saffron, yew leaves, etc. Carcasses of animals maliciously poisoned may also be brought to the meat market. Here the poison would probably be a mineral irritant, producing more marked inflammation of the stomachs and intestines.

CHAPTER VII

MODE OF CUTTING UP MEAT

Mode of cutting up beef—Mode of cutting up mutton—Mode of cutting up veal—Mode of cutting up lamb—Mode of cutting up pork—Mode of cutting up bacon.

HAVING devoted a chapter to "Animals, carcasses, and butchers' meat," another chapter to "The diseases of animals which render meat unfit for human food," and a third chapter to "The diseases of animals which depreciate the quality of the meat, render portions of the carcase unfit for human food, or in their later stages unfit the whole carcase for human food," it will be convenient here to introduce a chapter on the mode of cutting up meat.

The meat inspector is not required to have the skill of a trained butcher in dressing carcasses, but he should know at once whether a carcase be properly dressed. It is reasonable also to maintain that while a meat inspector is not required to be handy and ready at cutting up a carcase for human food, he should have some information as to the methods of dividing beef, mutton, veal, lamb, and pork which are ordinarily adopted.

It may be said that only somewhat general information can be given, because the mode of cutting up meat varies more or less in different countries, and to some extent in

different parts of the same country. This is obvious; it is well, therefore, to state definitely that the method to be described will be that usually practised in this country, more particularly by the London trade. In all points which appeared uncertain, London butchers or inspectors were consulted. The mode of dividing carcasses has not been taken from any treatise, but adopted after such investigations as the circumstances demanded. As regards illustrations, the outline and form have been copied from the "diagrams" in the third enlarged edition of *The New Century Cookery Book*, the introduction of which is dated August 1909. The author, Mr Charles Hirnan Senn, and his publisher, have kindly given permission for this use of seven of their diagrams.

Those who have access to the book mentioned can compare the illustrations in this chapter with Mr C. H. Senn's illustrations, and they will at once see the very considerable difference there is between the American mode of cutting up meat and the mode adopted in this country.

Mode of cutting up Beef.—When fairly young and tender, beef should have a fine open grain, and a deep red colour. It should be elastic to the touch. The fat should be white or yellowish-white and firm. Suet is the hard fat which protects the kidneys. It goes without saying that bullock beef is preferred to cow beef. Bull beef, being often old and tough, does not make prime joints.

An ox, cow, or heifer is divided as shown on p. 137.

The loin and the rump are prime portions, sirloin making the best joint for roasting, and rump being the best part from which to cut steaks. From the ribs good roasting joints are obtained, the end nearest the loin being the most choice. Parts are sometimes boiled or stewed. The aitchbone, coming next the rump, is suitable for roasting or

boiling. A more important joint is the round, which makes a good roast, being especially in favour at Christmas.

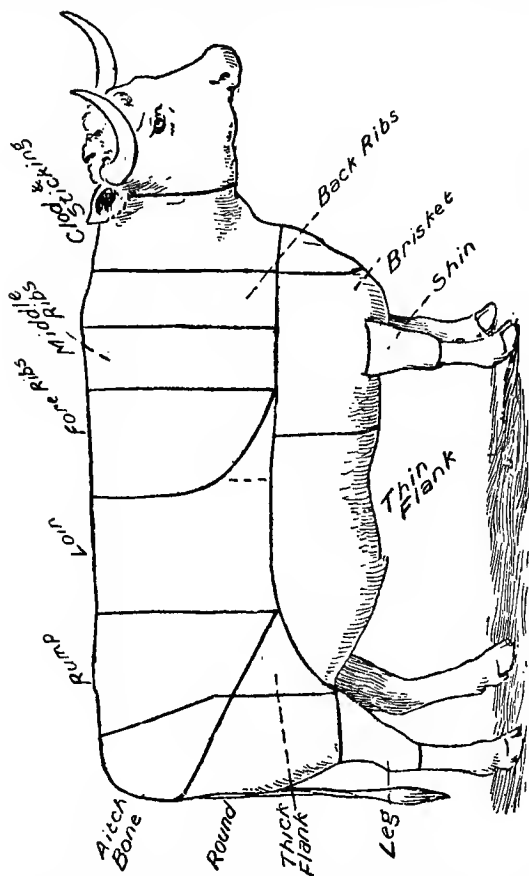


FIG. 39.—An ox, with surface lines showing how its carcase is divided.

Salted and corned this is excellent for boiling. Thick and thin flank are generally boiled or stewed. The brisket is

continuous with thin flank, and like it used for boiling or stewing. It is often salted and pressed. The neck, known to butchers as the "clod and sticking place," is used for soups and stews—occasionally for mince. The head includes the cheeks, but not the tongue. The cheeks are used in various ways, often for salads. The tongue is separately prepared and served. The hind legs make good stews, and are much used for soup stock. The same may be said of the fore legs. Ox-feet are not often seen at the butcher's. A place for them is found in cooked-meat shops. When fresh they make good jelly.

The tail, as everyone knows, is mainly used in the preparation of ox-tail soup.

Mode of cutting up Mutton.—A sheep should not be killed for eating till it is at least three years old. The best English Southdown mutton is obtained from sheep six years old. The flesh of mutton should be rather finer than that of beef, and of a deep red colour. The fat should be white and firm. It is less digestible than beef fat. Mutton ought to hang some time to ripen before being cooked, but the flesh of lamb is fit for cooking soon after the lamb is killed.

A sheep is divided as shown on p. 139.

Dividing a carcase of mutton is a comparatively simple matter. The prime joint is certainly the saddle, which, when nicely roasted, makes a perfect dish. This, divided in half through the backbone, forms two loins, excellent joints for roasting or baking. A loin may be cut into chops, which can be cooked in several ways. They are probably best grilled. The neck makes a good joint for roasting or baking. Often it is divided into two—the best end and the scrag end. The neck may be divided into chops or cutlets. These can be grilled or fried, or used for stews or

broth. The head is suitable for boiling, and makes excellent broth. The breast as well as the flap or flank is ordinarily boiled or stewed.

The leg is a fine joint for roasting, baking, or boiling. The leg of a wether is best for roasting or baking; the leg

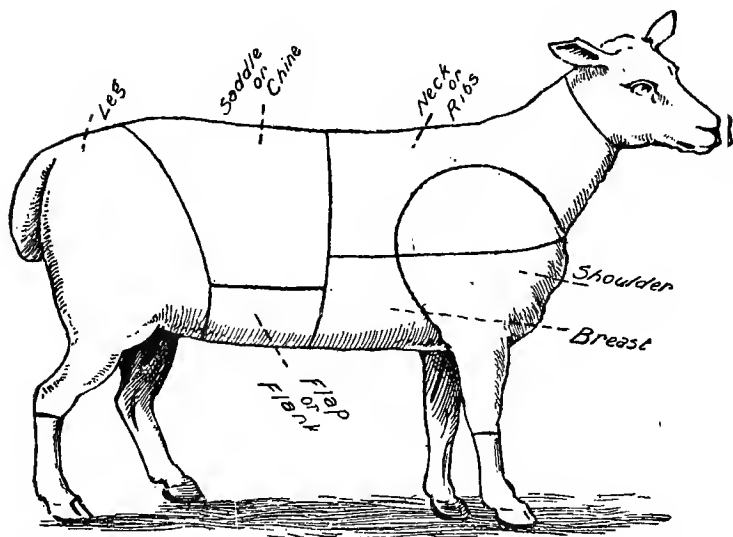


FIG. 40.—A sheep, with surface lines showing how its carcass is divided.

of a ewe is considered best for boiling. The tail is usually cut with one of the legs. The shoulder is suitable for roasting or baking. In the case of both leg and shoulder the bone is sometimes removed, and the joint stuffed with forcemeat. The trotters are made into broth with or without the head. Occasionally they are boiled or stewed.

When a carcase of mutton is fully dressed, the head is

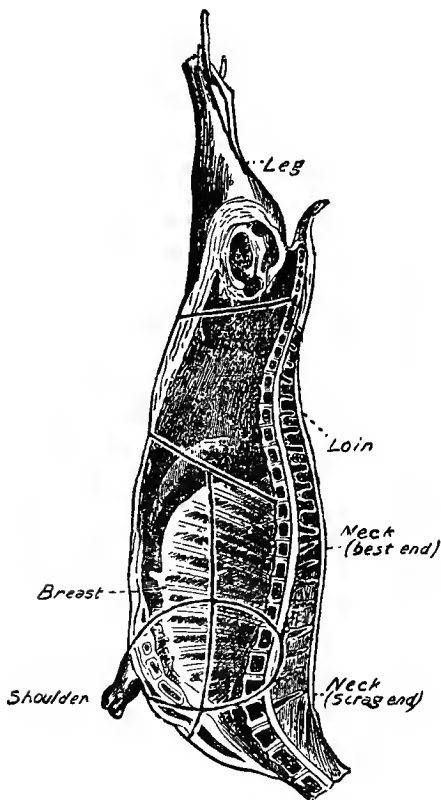


FIG. 41.—Side of mutton, showing the various cuts, joints, etc.

removed and so are the trotters. Half of such a carcase is the subject of the above illustration.

Mode of cutting up Veal.—Veal has always been much esteemed for its pale pink colour, which in some

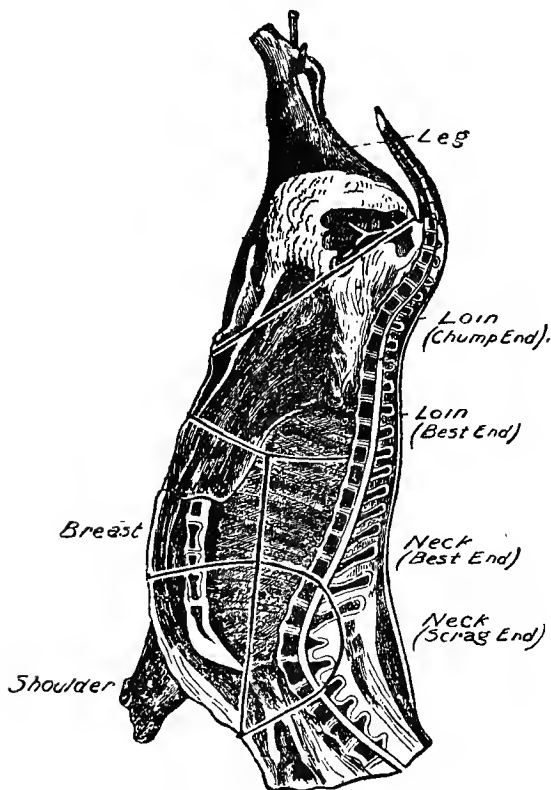


FIG. 42.—Side of veal, showing the various joints, etc.

cases is nearly white. Paleness is due to the animal being killed when very young, and possibly also to great care in

bleeding it. The season for veal is from March to the end of July; it is, however, obtainable throughout the year. More care is bestowed on the production of veal in the Continent than in England, and many consider that Continental veal is superior in flavour.

Veal is divided in much the same manner as beef. The illustration on p. 141 shows half a carcase of veal, with dividing lines between joints.

In a fully dressed carcase of veal the head, calf's feet, etc., have been removed. The head is usually boiled and served with a white or brown sauce, and the feet are usually made into jelly. In veal, loin is the prime joint. It is usually stuffed and roasted. The neck can be roasted whole, or divided into cutlets. The breast is usually stuffed and roasted whole, but it may be boiled or stewed. It is usual to roast the shoulder as it is, but it may be first boned and stuffed. Other parts can be stewed. Most parts are of great value for soups and jelly making, and for fritters or salad.

Mode of cutting up Lamb.—This flesh, like that of mutton, should be of good colour and quite firm. The fat should be white. Lamb is in season from January to July. It will not keep good so long after being killed as mutton. It is indeed better when eaten fresh.

Lamb, when dressed, is usually hung whole in the market or shop. Often, as depicted in the next illustration, the carcase is not even skinned.

Cutting up lamb is quite easy. The carcase is usually divided into two hind-quarters and two fore-quarters. The kidneys may be removed and sold separately. A hind-quarter may be divided into leg and loin, and a loin may be cut into chops. A fore-quarter may be divided into shoulder and neck, and a neck may be cut into neck chops.

The quarters should be roasted or baked, and the chops

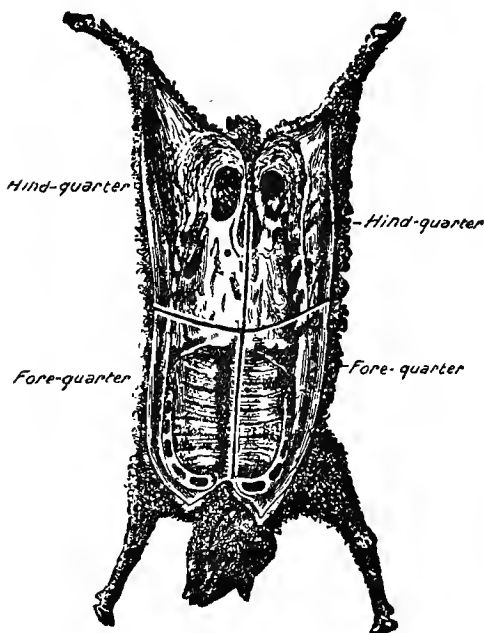


FIG. 43.—Dressed carcase of lamb with skin on.

should be grilled or fried. The head and the scrag end of the neck may be used for broth.

Mode of cutting up Pork.—Good pork should have a smooth, firm rind; the flesh should also be smooth and firm. Kidneys and glands should be of natural size, and healthy looking. Pork, like oysters, should only be eaten in a month with π in it. Pork is usually roasted, baked, or boiled. Salted or pickled pork may be boiled or stewed.

Pork, when dressed, is usually hung whole. The pork butcher removes the head and splits the carcase in his shop. Half a carcase, the pig's feet being also removed, is the subject of the next illustration (Fig. 44).

Probably the loin and leg would be considered by most people as the prime joints. When roasted or baked, the skin makes "crackling," which is much prized. Apple sauce is usually served therewith. An obliging butcher will cut the loin into joints of any size to suit the purchaser. Loin and spare ribs are often divided into chops, which are best grilled, but may be cooked in other ways. The blade-bone piece and spare ribs are commonly roasted or baked. The same may be said of the hand.

The leg, hand, and belly are all suitable for boiling. With boiled pork it seems to be the custom to serve pease pudding.

The head of pork is usually divided, each half making "pig's cheek." This may be baked or roasted, but it is usually salted and boiled. Collared head and brawn are made from pig's cheek. Pig's feet are usually boiled or stewed.

Pork with the skin stripped off is best avoided, especially if flabby or clammy to the touch. Pork, above all meat, is dangerous when consumed in such a state.

Mode of cutting up Bacon.—A side of pork, when salted and cured, is called bacon. This may be smoked or otherwise. The head may be cured whole, or divided and cured as pig's cheek.

The rind of good bacon should be thin and smooth, the fat should be firm and white, and the meat should be attached firmly to the bone. To ascertain if a ham or side of bacon is of good quality, insert a steel skewer or knife: if it comes out clean, and no disagreeable smell be detected, it may be taken as a sign that the meat and

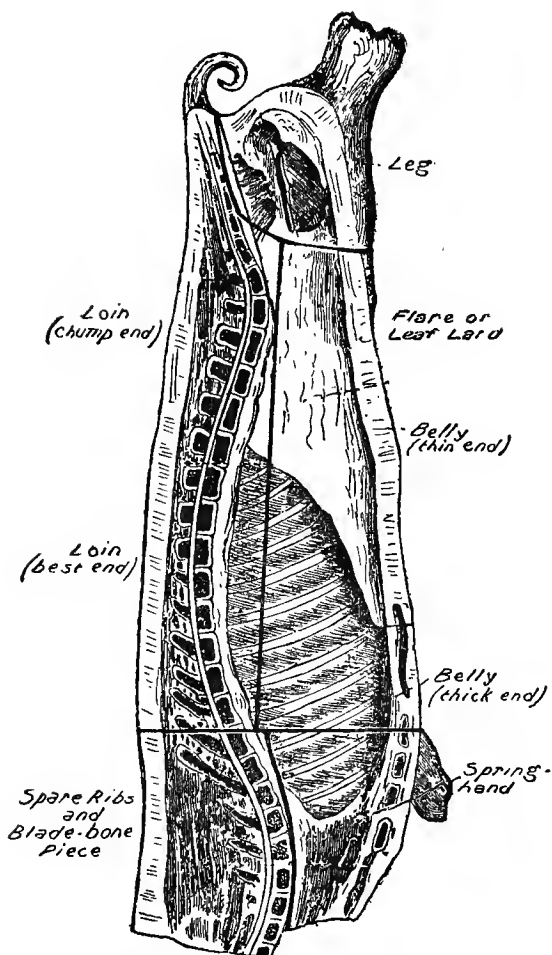


FIG. 44.—Half a carcass of pork, showing how it is cut up.

curing are satisfactory. Particles of meat clinging to the

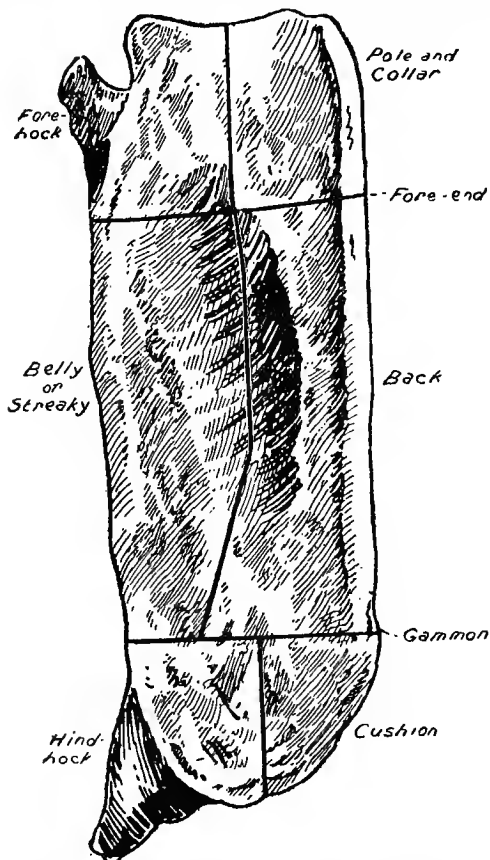


FIG. 45.—Side of bacon, showing how it is divided.

steel, and any disagreeable smell, suggest that the meat or curing are unsatisfactory.

Hams are prepared separately, and may or may not be smoked. A short thick ham is always considered the best.

Fig. 45 represents a side of bacon, and indicates the ordinary simple way of dividing it in this country. It will be seen that a horizontal cut separates the fore end, and that another horizontal cut separates the gammon or chump end. Each of these three portions is then divided into a front part and a back part.

As regards relative weight, the fore end might weigh about 16 lbs., the hind end about 13 lbs., and the middle piece about 30 lbs.

Of the fore end, the fore hock is not so choice as the pole and collar. Of the streaky bacon, the fore part is the prime end. Of the back, the fore part is the prime end. The hind hock weighs fully twice as much as the cushion. Both make good pieces for boiling.

CHAPTER VIII

POULTRY AND GAME

White-fleshed and dark-fleshed fowl—Capon and poularde—Good poultry—Diseases—Roup (tuberculosis)—Pip—Chip—Turn—The scour—Gapes—Parasites—Chicken-cholera—Pigeons—Game—Venison—Hares and rabbits—Feathered Game—When in season—Grouse—Blackcock—Capercaillie—Ptarmigan—Pheasant—Partridge—Quail—Corn-crake—Plover—Snipe—Wild-duck—Teal and widgeon—Woodcock—Game for invalids—Diseases of game.

Poultry, allied to the French word "poulet," a chicken, is a term which includes all domestic fowl propagated and fed for the table, and for their eggs. Poultry may be divided into white-fleshed fowl, as chickens, guinea-fowl, and turkeys, and dark-fleshed fowl, as ducks and geese. The white-fleshed fowl are tender, delicate-flavoured, and contain exceedingly little fat (3 or 4 per cent.). The dark-fleshed are harder, strong-flavoured, and rich in fat (often upwards of 40 per cent.). It is a common practice to deprive fowls of the sexual organs at an early age, that they may grow larger and improve in flavour and tenderness. Thus treated, a cock bird becomes a capon, and a hen a poularde. Young cocks and hens are about equally tender, but unless treated as above the cock bird soon toughens, and after a year old is only fit for soup. The term chicken should

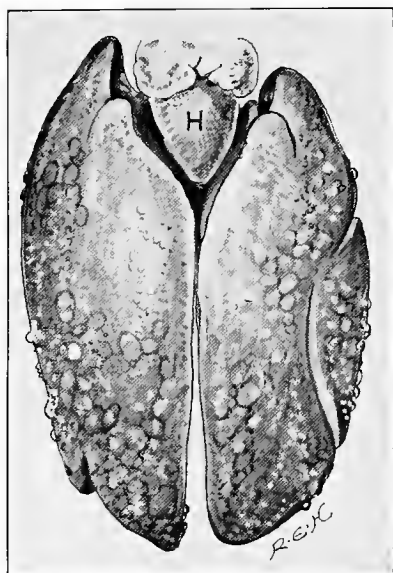


FIG. 46.—Tuberculosis of the lungs in birds.

properly be restricted to the young female bird under four months old, after which it becomes a pullet, till it begins to lay, when it is called a hen. Small-boned and short-legged poultry are, as a rule, preferred, and more likely than others to prove delicate and fine-flavoured. As regards feeding, naturally fed birds are better than crammed birds, and ducks fed on grain and vegetables are more delicate than those allowed to feed on animal offal.

Good poultry should be firm to the touch, pink or yellowish in colour, fairly plump, and should have a strong skin. It has a fresh, not disagreeable smell. Stale poultry loses its firmness, becomes bluish in colour, green over the crop and abdomen, the skin readily breaks, and the bird has a disagreeable odour.

Healthy poultry are bright and active, dry in the eyes and nostrils, their feathers are glossy and elastic, and the combs and wattles are firm and brilliant red. Age is indicated by duskiness of the comb and gills, dulness and fading and brittleness of the feathers, raggedness of feet, and size of claws.

The diseases to which fowls are liable may be briefly enumerated as follows :—

Tuberculosis.—Domestic fowls of every breed, including aviary-bred fowls and pigeons, are subject to various forms of tuberculosis, which may affect all the organs. The disease is most readily recognised in the lungs and liver. These organs are seen to be more or less closely covered with small yellowish spots. In a very little time they increase in size and form masses. The colour becomes paler and the texture soft.

Fig. 46 indicates the appearance of the lungs of a bird generally affected with tuberculosis. The large number of deposits would be certain to attract attention, if seen. How-

ever, in most cases the pluck, containing the heart and lungs, as in Fig. 46, would not be submitted to the inspector.

Roup.—This is probably the most common disease of poultry, and often appears among birds crowded together in ill-ventilated houses and on damp runs. It is characterised by an offensive discharge from the nostrils and eyes, swelling round the eyes, and purpling of the wattles. Often there is a distinct false membrane, formed by exudation, which may extend down the windpipe or along the alimentary tract. The disease is very contagious, and even the eggs laid by roup hens are not wholesome. Without doubt this disease is often true tuberculosis. Search for nodules in the liver and intestines. There is a less fatal and less serious form of disease known as dry roup, which is said to affect old birds chiefly.

Pip is indicated by a white horny skin growing on the tip of the bird's tongue. It is not serious, but shows the bird is out of sorts, and may be regarded more as a symptom than as a separate disease.

Chip is the name given to a kind of fever common in dairy farms, and seemingly derived from damp and cold. Young chickens are especially liable to it. They sit stationary in corners, crying incessantly, "Chip, chip."

Turn is apoplexy, affecting birds over-fed and taking little exercise. Without warning, the fowl totters and falls to the ground or drops from his perch. Death takes place unless assistance is promptly rendered.

The **Scour** is a diarrhoea due to various causes. It often results from improper food or sudden change of food. Without treatment the bird may soon succumb.

Gapes is a distressing malady of domestic fowls and pigeons caused by small nematode worms in the windpipe. The disease is so named from the gaping attitude assumed

by the affected bird. It is readily communicated, and often fatal.

Poultry also suffer from intestinal worms, large and small, as every cook knows. Skin disease is also not uncommon. This is generally caused by poor feeding and want of cleanliness, and associated with parasites.

A bird killed when suffering from roup is not wholesome food, and should be seized. Most of the other diseases referred to cause falling off in condition; but if a bird has been properly killed, feels firm, and looks sound, the inspector is not justified in seizing it.

Poultry suffer from a malady which has been called diphtheria, but no evidence has been adduced to show that this is a specific disease, or that it bears any true resemblance to the human disease of the same name. It is well to bear in mind that so-called diphtheria in poultry may be tuberculosis.

The only serious disease of poultry (besides roup or tuberculosis) which there is reason to believe directly prejudices the flesh, so as to absolutely prohibit its being used for food of man, is *chicken cholera*. When it is prevalent in a district the inspector is sure to hear of it, and be on his guard.

However, there is little evidence of the disease in birds carefully prepared for the market, and even an expert might not find it easy to demonstrate chicken-cholera microbes therein. The flesh is somewhat redder than natural, the liver probably softer, and the heart speckled with red or dark spots, often inside and out. The intestines are usually inflamed, or marked with red spots and livid patches. Domestic fowls, ducks, turkeys, geese, and pigeons are all subject to the disease.

Poultry affected with this malady, unless in cases where

it proves very rapidly fatal, exhibit characteristic signs of suffering. Their feathers are bristling, the wings droop, they sway from side to side, drag their legs, eat nothing, and drink much. The comb is flaccid and livid. There is usually (not always) diarrhœa, at first glairy, then foamy, and towards the end often streaked with blood.

Pigeons are not ordinarily included under the term poultry. The wild pigeon is still found in many parts of this country, especially during winter; but the blue house-pigeon is the variety ordinarily served for the table. Nestlings, while fed by their parents, are best for food purposes. These are called in the trade "squabs." At six months old they begin to breed. Pigeons are very liable to tuberculosis, the nodules being abundant in the liver and intestines. Birds thus diseased are unfit for human food.

Game includes all animals and birds used for human food pursued or taken in the chase or in the sports of the field. The animals are the red deer and fallow deer, and possibly some other species of acclimatised foreign deer (the flesh of all being called venison), and the hare and rabbit. The birds are very numerous.

Venison.—The fallow deer receives more care than the red deer, feeds closer, takes less exercise, and matures sooner. It is generally reckoned to make the best venison. It is much smaller than the red deer, and its horns are palmated. The buck is more esteemed than the doe. The haunch is regarded as a great delicacy, but neck and shoulders are also eaten. Buck venison is in perfection from midsummer to Michaelmas; doe venison is in season in the winter only.

Hares and Rabbits are both clean vegetable feeders. The flesh of the hare is darker in colour, and is much preferred for its superior flavour and digestibility. Young

hares, called leverets, are seasonable from May to August, other hares from September to February. Rabbits are seasonable all the year. It is important they should be fresh and fairly young. They seem specially liable to consumption, the deposits of the disease occurring in the liver, glands, etc. Rabbits thus affected should not be passed as fit for food of man.

Feathered Game.—The feathered game ordinarily sold in this country are blackcock or moor-fowl, corn-crake or landrail, grouse, partridge, pheasant, plover, ptarmigan, quail, snipe, teal, widgeon, wild duck, and woodcock. The time they are in season is indicated in the following table:—

Game. ¹	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Blackcock or Moor-fowl . . . . .	...	...	...	...	...	...	...	in	in	in	in	in
Corn-crake or Landrail . . . . .	...	...	...	...	...	...	...	12th	in	...	...	...
Grouse . . . . .	...	...	...	...	...	...	...	12th	in	in	in	beg
Partridge	in	beg	...	...	...	...	...	...	in	in	in	in
Pheasant	in	beg	...	...	...	...	...	...	...	in	in	in
Plover	in	...	...	...	...	...	...	...	in	in	in	in
Ptarmigan . . . . .	...	in	in	in	...	...	...	...	...	...	...	...
Quail . . . . .	...	...	...	...	...	...	...	...	...	in	in	in
Snipe	in	in	...	...	...	...	...	...	...	...	in	in
Teal	in	in	...	...	...	...	...	...	...	in	in	in
Widgeon	in	in	...	...	...	...	...	...	...	in	in	in
Wild-duck	in	in	...	...	...	...	...	...	...	...	in	in
Woodcock	in	in	...	...	...	...	...	...	...	...	in	in

¹ Under the Game Act of 1831 a penalty may be imposed on dealers in game who buy, sell, or have in their possession birds of game after ten days after the expiration of the season for killing them; and on other persons who buy or sell such birds after that

Grouse, called also red grouse or moor-cock, is plentiful in the Highlands of Scotland and Wales. It should weigh somewhat over a pound, the male bird being heavier than the female. It is in prime condition on "the 12th."

Blackcock, or moor-fowl, is also grouse, and may be distinguished by its greater size, and the dark plumage of the male. A female may weigh two pounds, and a male about three. It is plentiful in the Highlands of Scotland, and in various counties of England where there is heath to afford it food and shelter. Occasionally it is imported. There is a large grouse, the *capercailzie*, or wood grouse, which resembles blackcock somewhat in appearance, and also in its habits. The male bird is nearly as large as a turkey. It is taken in traps, and imported largely from Norway.

Ptarmigan, or white grouse, is about the same size as red grouse, and, like it, frequents wild, heathy tracts. Its plumage is white only in winter. It is found on most of the high mountains of Europe. Though an object of pursuit with sportsmen in Scotland, the market is largely supplied from Norway and the United States. It is imported into this country in February and in the two following months, when no other game is in season. The flesh has sometimes a bitter flavour, imparted to it by the bird's food. It is less esteemed than the red or black grouse.

Pheasant, the most beautiful of all feathered game, is abundant in France and many European countries, but

time, or who possess them, except for breeding purposes, after 40 days. Some time since the question was raised whether this prohibition applied to birds imported from abroad. The decision of the Courts as to its not so applying "is practically to permit the sale of game at all times, as the origin of the game is difficult of proof."

British birds are esteemed the best, being more carefully preserved and fed. The hen birds are smaller, and often more delicately flavoured. Pheasants are in best condition in October. Pheasants, like grouse, are considered to be much improved by keeping, and will usually keep six or seven days.

Partridge.—This bird, so carefully preserved in this country, is abundant in many European countries, and is largely imported. Partridges live principally on the ground, especially in mountainous districts, their food being mainly seeds, berries, and buds. Partridges are the most esteemed of all game, and are in best condition in September. When young the legs are yellowish and the bills dark-coloured. A species of the bird, known as the Guernsey partridge, has red legs. Unless young, partridges are apt to be very tough.

Quail.—Nearly allied to the partridge is the quail, but it differs from it in performing regular migrations. Some birds, instead of leaving England in the winter, merely go to the coast. It is in condition during the last three months of the year. The supply is chiefly imported.

Corn-crake comes to England about April, living, like the quail, in the long grass, and seeks a warmer climate for the winter. It is in best condition when grouse-shooting begins in August, and ceases to be in condition when pheasant-shooting begins. It is common in Ireland and North Wales, when it arrives, but most of the birds offered for sale probably come from England. The supply is not large.

Plover.—This bird is often very abundant in Scotland and parts of England. It arrives from abroad about April, and leaves in autumn. There are two species, green and grey; the former is smaller and is preferred. Plover is in

best condition about September, and is imported in large numbers in the winter. Plovers' eggs are esteemed a delicacy, and largely sold cooked. A considerable proportion of the supply is imported.

Snipe.—This bird, known by its small size, long slender bill, and short legs, inhabits marshy places and the margins of rivers, where it finds its food—worms and insects. In wet seasons it is found on higher ground. It is “in” during the four winter months, and considered to be in best condition in frosty weather.

Wild-duck, Teal, and Widgeon.—Wild-duck comes in with snipe; teal and widgeon a month earlier. Wild-duck is smaller and tougher, and less fat, than the domestic varieties of duck, of which it is the original. It is known also by its black claws. It is an inhabitant of all European countries, especially towards the north. In Britain it is plentiful at all seasons, but during winter or severe weather it quits the more exposed situations for places of shelter. But few of the wild-ducks supplying the market are shot. Nearly all, as well as other water-fowl, are captured by an arrangement of nets and decoy ducks. Both teal and widgeon are ordinarily taken in this manner. Wild-duck and water-fowl should be eaten young, but even then may be strong-flavoured or fishy.

Woodcock is held in high estimation, and rarely plentiful. It is somewhat larger than the plover. It breeds in northern latitudes, and comes to this country in October and November. Part of the supply is imported from Europe.

Partridges and pheasants are specially tender, delicate in flavour, and easy of digestion, and thus suited for invalids. Grouse, also, kept long enough to ensure its being tender, is suitable food for invalids. Quail, snipe, and woodcock, on the other hand, are usually over rich for invalids.

Game is, with few exceptions, rarely exposed for sale in a fresh condition. The fashion of the time justifies the practice of bringing it to market so "high" that it is really in a state of commencing decomposition, and the officer who seized game merely on this account would not have the support of the local bench. When evidence can be produced that game is really in part putrid, an order may be obtained for its destruction; but as there is no defined line between game that is merely "high" and that which is partly putrid, it is not possible to draw one. Most game-birds are liable to a cholera undistinguishable from that described as affecting poultry, and to many fatal diseases appearing as epizootics among them; but there are no characteristic signs whereby the subjects of any of these diseases may be known; should they find their way into the market. Intestinal worms are also often found in the bodies of game-birds, but they do not prejudice the flesh.

CHAPTER IX

FISH

White flesh, red flesh, and greasy flesh—Fish should be in season, fairly fresh, unbruised, and free from disease—Brill, coal-fish, cod, eels, conger eels, flounder, hake, haddock, halibut, herring, ling, mackerel, scad or horse-mackerel, monk-fish or angel-fish, grey mullet, red mullet, plaice, salmon, smolts, grilse, kelts—How to distinguish between the “clean-run” salmon and the “unclean”—Trout, skate, smelt or sparring, sand-smelt, sprats, soles, turbot, whitebait, whiting, “buck-horn”—Dried, salted, or smoked fish—Haddock-curing in London—Oysters, lobsters, prawns and shrimps, whelks, mussels, cockles, and periwinkles.

FISH, when fresh and good, and properly cooked, is a wholesome food, but varies much in nutritive value. It has been divided into *white-fleshed fish*, including brill, cod, flounders, plaice, sole, turbot, whiting, etc. ; *red-fleshed fish*, of which salmon is the type ; and *greasy-fleshed fish*, including eels, herring, mackerel, pilchard, sprats, etc. Scaleless fish are generally regarded as unwholesome, but the eel does not come under this description, as it has small, soft scales, scarcely visible.

Fish should be in season.—Fish is usually in the greatest perfection just before spawning. During this process it becomes flabby, thin, and wasted, and for some time after it is regarded as unfit for food, and said to be “out of season.” Fish which have not reached the spawning age, and a certain proportion which are barren, are always in

season. Crabs and lobsters, prawns and shrimps, and red mullet are in season all the year round. Oysters, as is well known, are not in season in the four months spelt without an *r*. A list is given of the fish ordinarily sold in fishmongers' shops in this country, and the month indicated when each is in season. The tabular statement has been prepared with some care, and is proximately correct; but no two authorities are agreed as to when some fish are in and out of season.¹ It must also be borne in mind that

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Brill . . .	::	::	in	in	in	in	in	in	in	in	in	::
Coal-fish .	in	in	::	::	::	::	::	::	in	in	in	in
Cod . . .	in	in	in	::	::	::	::	::	::	in	in	in
Eels . . .	in	in	in	::	::	in	in	in	in	in	in	in
Flounder .	::	::	::	::	::	::	in	in	in	in	in	::
Hake . . .	::	::	::	in	in	in	in	in	in	in	in	in
Haddock .	in	in	::	in	in	::	::	in	in	in	in	in
Halibut .	::	::	in	in	in	in	::	::	::	::	::	::
Herring .	::	::	in	::	::	::	in	in	in	in	::	::
Mackerel .	in	in	in	in	in	in	in	::	::	in	in	in
Grey mullet	in	in	::	::	::	::	in	in	in	in	in	in
Red mullet	::	::	::	::	in	in	in	::	::	::	::	::
Plaice . .	::	::	::	::	in	in	in	in	in	in	in	in
Salmon ² .	::	::	in	in	in	in	in	in	::	::	::	::
Skate . . .	in	in	in	in	::	::	::	in	in	in	in	in
Smelt . . .	in	in	in	in	in	::	::	::	in	in	in	in
Sprats . .	in	in	in	::	::	::	::	::	::	::	in	in
Sole . . .	in	::	::	in	in	in	in	in	in	in	in	in
Turbot . .	in	in	::	::	in	in	in	in	in	in	in	in
Whitebait .	::	::	::	in	in	in	in	in	::	::	::	::
Whiting .	in	in	in	::	::	::	::	::	in	in	in	in

¹ Cold storage is now so much used for game, fish and other perishable foods, that it is often difficult to say definitely whether these articles are actually fresh or drawn from the cold store.

² Section 19 of the Salmon Fishery Act, 1873, makes it an offence to be in possession, for the purpose of sale, of any salmon between September 3rd and February 18th, even though the fish be quite clean.

the time of spawning, which regulates "seasonableness," varies a little from year to year. Fish out of season, when boiled, is more transparent, and has a bluish tint.

Fish should be fairly fresh.—Some fish, such as mackerel and herring, appear to begin to decompose very rapidly, and a very little keeping spoils them. Flat fish, as a rule, bear keeping better. Turbot, for instance, is improved for being kept a day or two. Cod, whiting, and haddock, if kept in a cool place and rinsed with salt water, will keep good for two or three days.

The freshness of fish is indicated by its being firm and stiff. In really prime condition, if held out in a horizontal position, it will remain rigid. Any drooping of the tail shows that it is not quite fresh, and, indeed, the extent of this drooping may not unfairly be taken as a measure of want of freshness in the fish. Fish hawked about the streets is what shops have failed to sell, and much of it is very limp. However, before an officer is justified in seizing fish, it must be a stage beyond being merely not quite fresh. If the fish, besides being limp, is actually softened in parts, and the flesh easily separates from the bone; if the gills are a dirty colour, or dry, or exude a dirty brown fluid; if the eye is dull and the skin over it not transparent; or if the fish has a distinctly disagreeable odour, there is sufficient evidence of commencing decomposition to warrant seizure.

Dr Anderson, in an official report in connection with this matter, considers the following tests as fairly reliable in the detection of decomposition:—

1. When *rigor mortis* has passed off.
2. When there is a reddish discoloration along the backbone.
3. When the smell is becoming tainted and passing on to the putrid stage.

4. When the flesh strips readily and cleanly from the back-bone.

5. When the abdominal walls have a soft, pulpy, and jelly-like appearance, with commencing discoloration and tainted odour.

6. When the gills have lost their characteristic tint, and are becoming grey and slimy.

7. When the eyes are grey and sunken.

When these conditions are present, undoubtedly the fish can, and should be, condemned.

Fish should be unbruised and clean.—Much fish gets jammed and even broken in the nets, and this is sorted out for sale to the poor, or if unsaleable goes to manure the land. There is no objection to its being eaten if perfectly fresh; but the effect of bruising is to render the fish unfit for keeping even for a day, so that bruised and broken fish is nearly always unwholesome when offered for sale. If the scales are not bright and in order, it indicates that the fish has been ill-used or is stale. Fish taken from foul waters may be offensive or unwholesome. Fresh-water fish from a muddy river bottom may require much soaking in salt and water before they part with the smell and taste of the mud. Again, fish from sewage-polluted water are sometimes as unwholesome as the sewage-polluted water itself. Fish may also be damaged or spoiled through the entrails not being removed soon after death.

Fish should be free from disease.—Apparently healthy pilchards, herrings, and many other fish, as well as mussels and oysters, even when in season, may occasionally, on being eaten, produce symptoms of poisoning. Attempts to isolate the poison in such cases have failed, and it is thought the fish may themselves have been feeding on un-

wholesome food. There is certainly nothing to distinguish such fish from others. So little is known about fish disease that it is possible the fish, etc., causing such symptoms may have been diseased. The only fish disease which seems to have been carefully studied in this country is salmon disease. At times when salmon disease is prevalent, it is not unlikely that fish affected with the disease may be sent to the market. The disease is due to a parasite, its visible sign being a fungous growth, especially about the head, which, so to speak, eats its way into the sound flesh. A sanitary officer would be warranted in seizing a fish thus affected.

A few brief remarks may be made here upon the fish commonly exposed for sale in this country, taking them in alphabetical order.

Brill is a flat fish of oval form. The flesh, like that of the turbot, should be of a yellowish tint. It is inferior to turbot and sole, but superior to plaice and flounder. The flat fish, or side-swimmers, are called also trawl fish, as they are taken on the coast or in tidal rivers by trawling over the bottom. The most common in British waters are brill, two or three sorts of dab, flounder, fluke, halibut, plaice, several sorts of sole, and turbot.

The upper side, on which are both eyes, is usually coloured, the under side white; but some fish are entirely white, and fish coloured on both sides are not uncommon.

Coal-fish or Saithe.—This fish, being fairly plentiful in many parts and inexpensive, has many local names, but the first of the names given above is known to every fishmonger. The shape of the fish is well shown in Fig. 47.

The back is slate-coloured, sometimes very dark, and the belly is silvery white. A distinct white lateral line divides the back from the belly. Portions of coal-fish are said to be often sold as hake, though there is no striking resemblance

between these fish. Neither taste or quality is quite equal to hake. The flavour of coal-fish is indeed a little peculiar, and seems to be imparted from the skin. The big fish (at times reaching thirty pounds in weight) are not as "good eating" as the younger and smaller ones.

Coal-fish is at its best from September to February. Much is sent us from Scotland—it is more plentiful on the east and north coast than on the west coast. Our markets

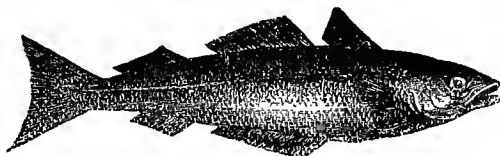


FIG. 47.—The coal-fish.

are also supplied with coal-fish from the North Sea, Iceland, and the Farøe Isles.

Cod is one of the best known of white-fleshed fish. Fishermen are able to preserve them alive for a long time. The "sound," or swimming-bladder, is pierced with a needle and the air disengaged, so that when the fish is put into the well of the boat it sinks to the bottom. When the fishermen come to shore the cod are packed into boxes four or five feet wide and deep, and about ten feet long, and the boxes floated or sunk in a tidal river. The cod, though alive, are packed so close that they cannot bruise themselves with struggling. The water is renewed as the tide goes in and out, through holes bored in the sides of the boxes. Cod will live in these boxes eight weeks, and they are frequently kept for that time, all the while without food. They are removed from the boxes as they are needed for the supply of the market, being killed by a stroke on the head with a mallet. This close confinement and starving is certainly

cruel, and cod thus treated must be depreciated in quality. In some places a yet more cruel method of keeping cod alive is adopted. After removal from the boat-well they are tied by the tail to a rope, many of them together, and sunk in deep water. Their tails get sore and lacerated from the string making them fast to the rope.

Cod in good condition should have the sides undulated as if it were ribbed. It should be round and plump near the tail, and the hollow behind the head should be deep. (*Vide* Fig. 48.)

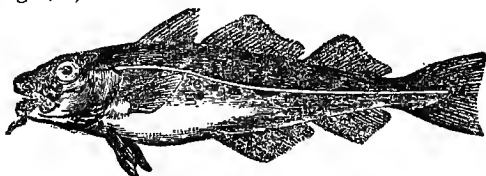


FIG. 48.—The cod.

The flesh should be very firm, and when cut raw it should have somewhat the metallic appearance of the silver side of a round of beef.

Eels.—At least three distinct species of fresh-water eel are sold in the market. The sharp-nosed eel is the most often seen. The broad-nosed eel is not uncommon. It is relatively larger round the body, and has a wide mouth and thick skin. A third species (occurring chiefly in the Avon) is the snig eel, a small light-coloured eel, seldom exceeding half a pound in weight. Eels are caught in the Thames in a basket-work apparatus fixed on a wooden frame, called an “eel buck.” On the Severn eel nets are used. A large number of eels are imported from Ireland. They come over packed in boxes alive. Elvers should never be taken, and in good eel fisheries passes should be provided for them over natural obstructions. The eel is most tenacious

of life, and can live long out of water owing to its being able to store water to keep its gills moist. These little stores on either side of the head serve as "breathing bags." When once dead the eel keeps no longer than other fish. Perfectly fresh eels may have a faintly disagreeable smell from the foul mud from which they have been taken, and if the mud be sewage-polluted the eels may be unwholesome.

Conger eels are commonly taken off the Cornwall and Devonshire coasts, and near Dover and Folkestone; but many are imported from Ireland and the Channel Islands, and from France. During the cold weather they are in a torpid state in deep water, but may be caught from March to October. Seven or eight pounds is a full weight for a large fresh-water eel, but congers may weigh ten times as much. They are caught on a line. Whether it be true that a large proportion of the turtle soup sold in London is made from conger seems doubtful, but conger certainly makes a fine thick "stock," and is excellent food.

Flounder.—This is a well-known flat fish, more elongated in form than the plaice, but much smaller. Fig. 49

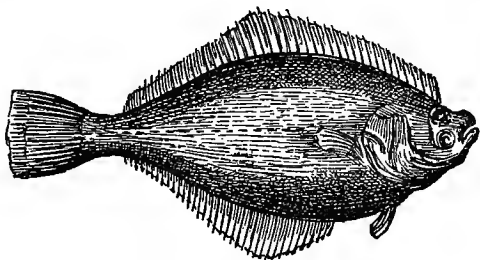


FIG. 49.—The flounder.

well represents the fish. It is common in British seas, and ascends the rivers beyond the reach of the tide. It is abundant and cheap.

Hake belongs to the family of the cod-fish. It has an elongated body and a broad flat head, the mouth being very wide and the lower jaw extending beyond the upper. It is a common, somewhat coarse fish. It is said to be

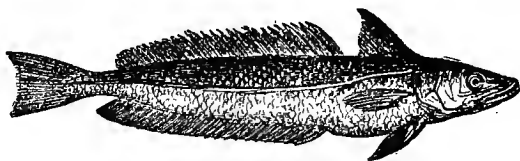


FIG. 50.—The hake.

sometimes sold as cod. A glance at Fig. 50, representing the hake, will show that the resemblance between the two fish is not great. However, after being beheaded, opened, salted, and dried, hake might possibly pass for cod.

Haddock also belongs to the cod family, and much more closely resembles the shape of the common cod than the hake. Like the cod also it is commercially of great importance. Haddocks occur in immense shoals all round the

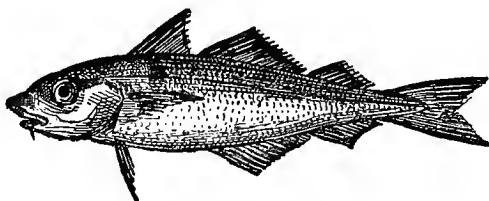


FIG. 51.—The haddock.

coasts of the British Isles. In stormy weather they hide in deep water, among seaweed. On each side of the body, just above the fin behind the gills, is a dark spot called the mark of Peter's thumb. The position of this mark is well shown in Fig. 51, which represents the haddock. The

haddock as brought to market does not weigh more than from two to three or four pounds.

Halibut is the largest of the flat fish brought to market, measuring from three to six feet long. It is a northern fish, being taken off Greenland, Norway, and Scotland. Halibut are sometimes kept alive packed in large perforated boxes, which are sunk or floated in a dock or shallow water. Like cod, they may be thus kept alive for as long as eight weeks. A fine halibut often weighs upwards of a hundredweight.

Herring.—This fish is of great importance commercially, there being large herring fisheries in all the three kingdoms. The word herring is derived from the Dutch word “herr,” an army. The fish occur in enormous shoals, extending for miles. Fresh herrings should be mature, full fish, as there is a large market for inferior qualities as bait. The herring dies as soon as removed from the water, and does not keep well fresh. A herring weighs on an average a little over five ounces. A cran ($37\frac{1}{2}$ imperial gallons) contains about 800 mature herrings, or about 1000 immature herrings. A barrel contains rather less; 132 herrings go to the nominal hundred; a last therefore contains 13,200 fish.

Ling is another of the cod family, and a most important article of commerce, particularly in Scotland. Ling, like



FIG. 52.—The ling.

cod, is caught on lines, and more men are said to be employed in ling-fishing than in cod-fishing. Ling-fishing is carried on from May to August. Ling, in form (*vide* Fig. 52), bears no resemblance to any other fish. It is firm in texture,

and good eating, yet commonly cheaper than hake. As in cod, the liver contains abundance of nutritive oil. Ling are taken four or five feet in length, and weighing over forty pounds.

Mackerel, like herring, is a greasy-fleshed fish, and does not keep well. It is fished for from February to November, the chief fisheries of the country being on the south and west coasts. Different fisheries have different seasons—thus the Cornish fishery is from February till June, and the Rye (Sussex) fishery begins in April; other fisheries begin in

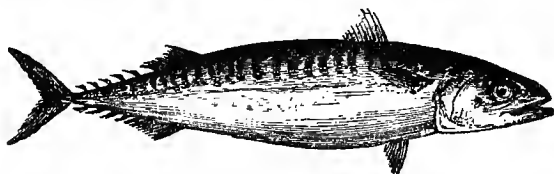


FIG. 53.—The mackerel.

May. The average weight of a mackerel is a little over one pound, and it rarely exceeds two pounds in weight. It is figured above (Fig. 53). Mackerel are reckoned in boxes—fifty fish going to a box. The freshness of the mackerel is indicated by the brightness of its appearance. Redness about the head is a sign that it is getting stale.

Scad, or Horse-Mackerel, is smaller and more grace-

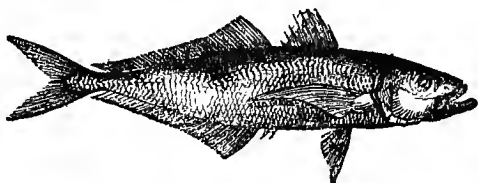


FIG. 54.—The scad or horse-mackerel.

ful than mackerel, but the flesh is considered coarser. That this fish may be recognised at once, it is also figured

(Fig. 54). It frequents many parts of the coast, and is often taken off Devon and Cornwall.

Monk-fish or Angel-fish.—The fins, on each side of the head of this fish, must have suggested a monk's cowl to some people, and an angel's wings to others. In this way the sea monster got the two names by which he is best known. It is also called a fiddle-fish, from a fancied resemblance in shape to a violin. The form of the fish is well shown in Fig. 55.

In some localities fishermen have named this fish the

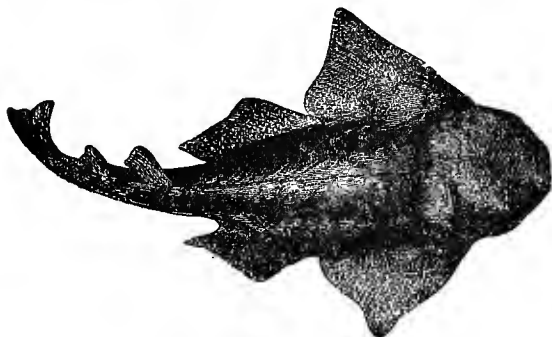


FIG. 55.—The monk-fish or angel-fish.

“shark ray,” probably owing to its often being taken on the long lines set for ray, etc. Indeed, it appears to be allied to the ray family. Its body is flat, and identified at once by the large flexible fins already referred to. The colour is brown, rather dark, with a few spots or marks of a lighter tint. It feeds on many kinds of flat fish, hiding itself in the sand, and suddenly rushing out on them. Thus it is taken by the trawl net more frequently than on a line.

It is not considered very “good eating,” which may be

partly due to the fish having a strong smell of ammonia. It is said to be often sold in the fried-fish shops as skate. When quite fresh, and not too large, portions are occasionally passed off for cod. It is, however, larger than cod, a big specimen of a monk-fish measuring five feet long and weighing upwards of fifty pounds. It is not uncommon in many parts, the home supply coming largely from the North Sea and the British Channel.

Grey mullet.—This fish is found mainly in shallow water, along shore, particularly off Devon and Cornwall,

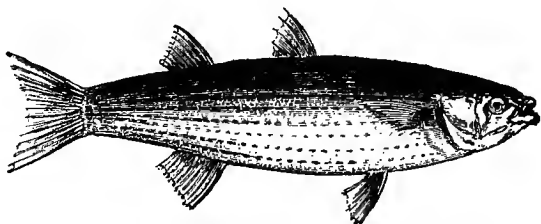


FIG. 56.—The grey mullet.

but it is occasionally taken in the deep sea. Its handsome round form is well shown in Fig. 56.

It is silvery grey, with dark markings along its sides. The flesh is firm and of a delicate flavour. Ordinarily, grey mullet, as sold, is about one pound in weight, but fish weighing up to ten pounds are taken from time to time. Being a choice fish it brings a good price. It is in excellent condition from July to February.

Red mullet is very different from grey mullet, but, like it, is most abundant along the south and south-west coast, especially Devon and Cornwall. It is at its best while the roe is forming, during the summer months.

This fish should be bright-eyed, generally round in form

and thick in the shoulders. The fish should be firm and elastic, as well as exceptionally free from fat.

In order that the much-prized red colour may be preserved, fishermen scrape off the scales of the fish as soon as it is dead, and before *rigor mortis* (death stiffness) sets in. Much care is needed in handling so delicate a fish, as it is easily damaged.

A choice fish weighs about two pounds, and is about fifteen inches long; but generally, as seen in the shops, a fish weighs only three-quarters of a pound. It is thought that the flavour of the fish improves with its size.

Red mullet is commonly cooked undrawn, and in this way the natural plump appearance of the fish is retained.

Plaice.—This well-known flat fish is very abundant, tenacious of life, and keeps well. There are two kinds,

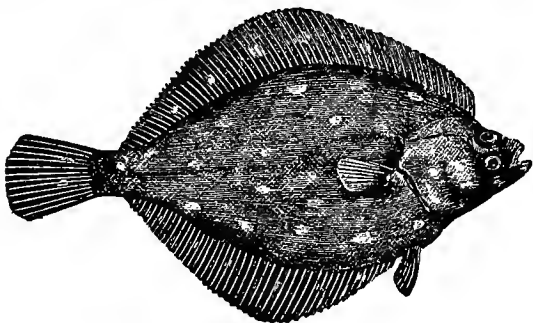


FIG. 57.—The spotted plaice.

with spots and without spots, the former being sometimes called diamond plaice. The spotted plaice is shown in the above illustration (Fig. 57). Probably the finest spotted plaice are taken on the Brown Bank and Well Bank, on the Dutch coast, and between Hastings and Folkestone. The average weight of a plaice is about one pound.

Salmon.—This fish should be plump and clean looking, the scales bright, the belly firm and thick, and the flesh on section should be a rich red. Fig. 58 shows the form of a mature fish in fair condition.

The salmon periodically leaves the sea, and ascends rivers and streams to deposit its eggs on gravel forming the bed of such a river or stream. The eggs deposited by the female fish, and subsequently fertilised by the male fish, eventually hatch out. The young fish are called "parr," a name they retain till they lose their trout-like appearance and descend to the sea as "smolts" in May or June. Some migrate the first year; others not till the second or third



FIG. 58.—The salmon.

year. Remaining in the sea for a few months or a year, they return to the river as "grilse." The parent salmon, after spawning, descend to the sea very much out of condition, and are then called "kelts." In the sea they recover, and when they ascend the river again are in good condition. The kelts (male and female) are weak and poor, and should in no case be taken. Numbers of them die, apparently of exhaustion, before they reach the sea. Indeed, by an Act passed in 1861, it is made illegal wilfully to take any unclean or unseasonable salmon, or to buy, sell, expose for sale, or have in possession the same or any part thereof. It becomes, then, important to know how to tell an unclean and unseasonable salmon. On this subject Mr Frank Buckland

says, "firstly, that the external colouring of the scales of a salmon is by no means invariably a safe guide to its real condition; secondly, that the appearance of the pyloric appendages is most valuable in diagnosis; and, thirdly, that the actual state of the development of the ova or milt is a point to which the strictest attention should be paid. The salmon feeding in the sea gradually accumulates great quantities of fat. A certain portion of the fat is deposited in the cellular tissue between the skin and the muscular system; but an admirable arrangement for the storing up of the main bulk of this winter food is found in the presence of the pyloric appendages; these are long, worm-like, fleshy offshoots from the intestine, situated immediately below the true stomach. In the salmon there are 45 to 65 pyloric appendages. The process of developing ova and milt is a great tax upon the system of the salmon, and the oily matter in the eggs and milt is very great. I believe it therefore sound physiology to say that the use of the fat stored up in the pyloric appendages and under the skin is, first, to supply nutrition to the fish during its sojourn in fresh water; and, second, to afford materials for the development of the milt and ova. The blocks will illustrate this—*a* is the œsophagus, *i* the intestines, *p* the pylorics *m* the milt.

"In the case of the 'clean-run' salmon (Fig. 59), the pylorics can hardly be distinguished on account of the mass of fat which envelops them, while it will be remarked that the milt is very small. It was, in fact, an 'up' fish. The other block (Fig. 60) represents the same structure from a spawning fish. The fat has entirely been absorbed from the pyloric appendages, while the milt is very large, the fish having been taken on or near the spawning beds. Spawning operations being over, the fish would at once descend

as a kelt, or unclean fish, to the sea to get on his pylorics a fresh store of fat."

As clean fish are caught going up the river in February and March, just at the time the great majority of salmon are coming down as kelts, there would appear to be a spring

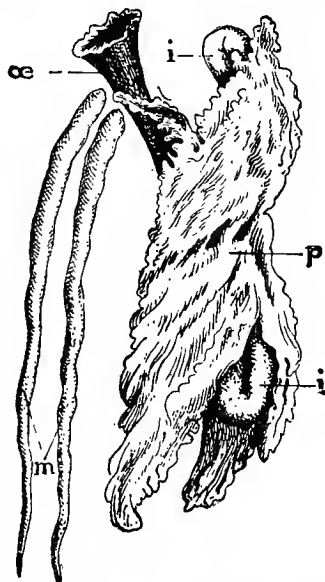


FIG. 59.—Milt and pyloric appendages of "clean-run" salmon.

migration as well as an autumn migration of salmon into the rivers. However, after what has been said, an "up" fish could not be mistaken for a "down," though a fish coming up the river in the spring could not probably have accumulated as much store fat as if he had remained in the sea till the autumn. These early clean salmon, of course, fetch a good price. Though salmon is fairly abundant in the

British Isles, great quantities of the fish are imported from many lands. Large Dutch salmon are imported in the winter, from the end of November to the end of January.

In the rivers of Canada and Australia salmon are

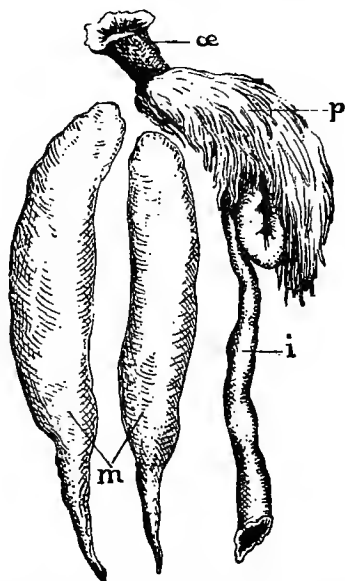


FIG. 60.—Milt and pyloric appendages of “clean-run” spawning salmon.

caught in a revolving trap, which looks like a water-wheel. From the trap the fish are passed into a trough, where they are killed. Eventually they are sent to cold stores, or a canning factory.

There is an extensive trade in frozen and chilled salmon, which reach this country from Canada, Russia, Siberia, etc.

This may be sold at any time, provided it has on it the seal of the Fishmongers Company.

The common trout, the bull-trout (a white-fleshed fish), the sea-trout, the sewen (caught in Wales, Devon, and Cornwall), and the charr (of the Lake district) are all fish belonging to the salmon family.

Skate.—There are several varieties of the "ray" family put on the market under the general name of skate. The common skate has a smooth skin, in colour pale grey, with black spots. This fish is more frequently seen in the market than any other. It is a big fish, too, the larger ones weighing up to a hundred and fifty pounds, and occasionally as much as two hundred pounds. Fig. 61 is an excellent representation of this fish.

It should be firm, broad, thick, and white in the flesh. This fish belongs to what are termed "cartilaginous fishes," the bones being simply cartilage. Skate is highly nutritious, and easy to digest. Further, it has the great advantage of keeping fresh for a longer period than other fish. It is often sold crimped. Skate, being found in fair abundance round the coast of the British Isles, is cheap.

The thornback skate, called thus owing to the spines on its back, is in quality rather inferior to the common skate. The white skate and the homely ray are also inferior.

Smelt or Sparling.—The true smelt is taken at Boston, Lynn, Norwich, and Brighton, and in the estuaries of many rivers running into the Solway. It spawns at the head of the tideway, never going further up a river than the brackish water. The smelt has a peculiar odour, which has been compared to the smell of violets. The sand-smelt, plentiful on the south coast, is sometimes sold for the true one. The quality of the flesh is, however, inferior.

Sprats, when fresh, are bright, like polished silver, and

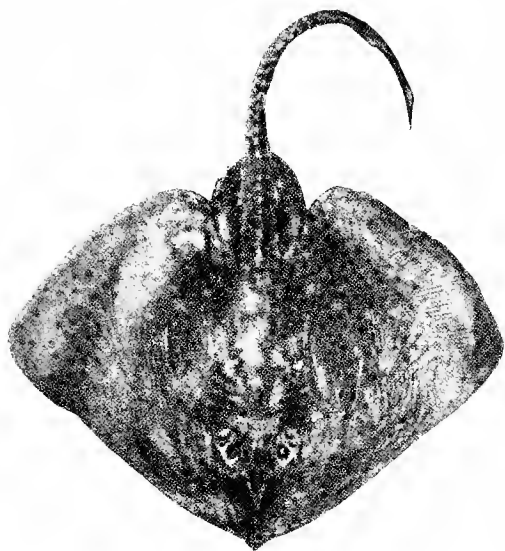


FIG. 61 —The skate.

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soon lose their freshness. Though they belong to the herring family, they are not young herrings, but a distinct species. They are often very abundant off the coast, being taken for the most part in winter. They specially favour the coasts of Suffolk, Essex, and Kent. When the market is glutted large quantities are sold for manure. There is good authority for saying that sprats are occasionally manufactured into what passes for "anchovy paste." Salt, saltpetre, prunella, and red colouring matter are added, and then the mixture is well pounded and pressed. If bottled



FIG. 62.—The anchovy.

as anchovies they would be recognised by the shape. *Vide* figure of anchovy—Fig. 62.

Soles come to the banks and coasts of estuaries to spawn, and for food, but in the winter return into deep water. They are taken, like most flat fish, by trawl-nets. As a table fish the sole ranks next to the turbot. The flesh is delicate, white, and very firm. Besides the common sole there are three other varieties of *Solea* sold in the shops—the lemon sole, the variegated sole, and the little sole. Lemon sole is a brown orange in colour, and spotted. It is smaller than the common sole, but wider in proportion. It is inferior in quality, the flesh being less firm. The variegated sole, called thus from the colour of the upper side, is rare. It is smaller than the lemon sole, scarcely attaining six inches in length. The little sole, or red sole, is four or five inches long, and comes up in the trawl-nets with the others.

Turbot, the most esteemed of flat fish, should be thick and firm, and the flesh yellowish white. When the fish is purchased whole the purchaser is likely to get what he asks for, as the turbot is rounder in shape than the plaice, and its spots are smaller and more numerous. Compare Fig. 63, representing the turbot, with Fig. 57. There is, however, no doubt that cut-up halibut is often sold as turbot, though the smooth upper surface of the turbot is quite different from the tubercle-covered surface of the halibut. Turbots

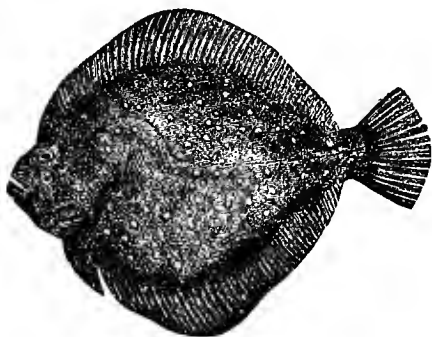


FIG. 63.—The turbot.

are taken in trawl-nets with other flat fish off the English and Dutch coasts and the Flemish banks. When the weather has driven the fish into deep water, they are fished for with many-hooked lines. A turbot commonly weighs from five to ten pounds.

Whitebait seem to be specially attracted to the Thames, and are netted in large quantities off Gravesend, Queensborough, Leigh, Southend, etc. They are usually sold by the quart. Whitebait appear to have been first used as human food about 1780, their use before being

as bait for crabs, etc. Whitebait are not a distinct species of fish, but the fry of herrings, sprats, weevers, sand-eels, smelts, etc. The little fish swim higher in warm weather; therefore the warmer the season the better the take of whitebait.

Whiting is in much esteem, and the most delicate-flavoured fish belonging to the cod family. Its form is well shown in the illustration, Fig. 64. It is caught all round the coast, but especially at Plymouth. It will not keep long, and suffers damage from packing and carriage. Large whiting (from two pounds to three pounds when fresh) taken off the

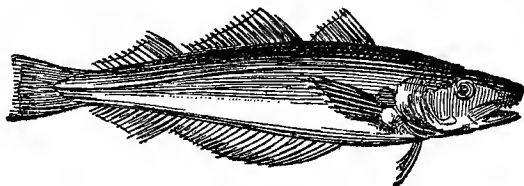


FIG. 64.—The whiting.

coast at Dartmouth are sun-dried by the fishermen and sold under the name of "buckhorn."

Dried, Salted, or Smoked Fish.—The preserved fish ordinarily met with in the markets in this country are barrelled cod, dried salt cod, smoked haddock, cured salmon, red herring, kippered herring and bloaters, and dried sprats. In examining cured fish it is important for the food inspector to remember that fish-curing is not confined to large establishments properly supervised, but is done on the premises of petty vendors all the year round. Fish that is already stale and just beginning to turn is put into the brine-tub for a few hours, and then rapidly smoked or sun-dried or wind-dried. Even if the fish be perfectly good when the curing begins, the process is so quickly gone through that it

will not ensure the keeping of the fish for any long period of time. Thus cured, fish is often bad and unwholesome, and the superficial curing hides its defects.

Barrelled Cod.—As soon as caught the fish are beheaded, opened, cleansed, and salted. They are then stowed in beds, heads to tails, in the ship, a layer of salt being placed between each layer of fish. After a few days, when they have well drained, they are again salted and stowed. Finally they are packed in barrels, after being previously cut into large pieces. A barrel contains about forty fish.

Dried Salt Cod.—The cod, after being beheaded, opened, cleaned, and salted, is laid out on the shingle of the shore or on low walls, and dried by the sun. Dry salt cod weigh about five pounds a-piece.

Dried Salt Ling.—Ling is prepared at the Scotch fisheries nearly in the same way as cod. It is split, well salted with brine, washed, and dried by the sun.

Smoked Haddock, commonly called “Finnon” haddock, is so named after the fishing village of Findon, near Aberdeen, where haddock smoking with peat has attained perfection. Enormous quantities are smoked in London and other large towns. Mr J. K. Lord, in a communication to *Land and Water*, describes the process of haddock curing as carried out by costermongers on the Surrey side of the Thames. In a small railed enclosure he found tubs, pans, and vessels of all descriptions, “filled with a fluid of yellow colour and oily consistence,” which, he was informed, was the pickle, a solution of salt and water. “Occupying one corner stands a sort of sentry-box, or curing-house. It is composed of scraps of plank, staves of casks, fragments of oilcloth, and old rags for caulking; numerous ledges are nailed along two of the sides. The haddocks are brought into the enclosure, and boys and girls

at once commence removing the heads from the fish, split them open, scrape off all the dirt, and plunge them in the pickling-tubs according to size. The fish soak in pickle for about three hours, and then the skewering-up process commences. The larger haddocks are first, one by one, taken from the tubs, and a peeled rod is passed through each fish until there are as many as the rod will contain; the ends are laid upon the lowermost ledges in rows until filled up, and so on until the smallest are on the top ledges. A fire is kindled on the ground, which is kept smouldering by a judicious application of sawdust underneath the haddocks. The curing-house is closely shut up, and when the haddocks are sufficiently tinged of a yellow colour they are considered to be cured. From six to eight hours is quite sufficient time to enable a skilled curer to split, salt, and smoke a load of haddocks fit for sale." Sometimes imitation Finnon haddocks are made without the aid of smoke, the fish being washed with diluted pyroligneous acid, and hung up to dry. Finnon haddocks pack about 300 to the barrel.

Cured Salmon.—Salmon curing is very simple, but takes a long time. The fish is split and cleaned, and salt well rubbed in. It is then left in vessels, covered with strong brine pickle, for six or seven weeks. Then it is carefully pressed, and finally packed in casks with alternating layers of salt. Smoked salmon, so common in many parts of the Continent, is scarcely seen in this country.

Red Herrings, Bloaters, and Kippers.—Red herrings, and so-called Yarmouth bloaters, are prepared very largely by the poor, and not merely in factories. They are soaked for twenty-four hours or a little longer in strong brine, and hung up to smoke over a wood fire. Kippered herrings are first split and flattened out like Finnon had-

docks. Red herrings are commonly packed in barrels, 500 to 700 the barrel, according to condition. Bloaters are reckoned in baskets, 150 to the basket. Kippered herrings are sold by the score or dozen in boxes.

Dried Sprats.—Sprats are cured by being soaked in brine and then dried, with or without smoke. At Yarmouth and Gravesend they are cured like red herrings. They are commonly made up in bundles of 30.

Shell-fish.—The shell-fish ordinarily sold in this country are oysters, lobsters, crabs, prawns, and shrimps, whelks, mussels, cockles, and periwinkles.

Oysters are found round the coast wherever there is a suitable shore. Off Essex and Suffolk they are plentiful. They are obtained from the oyster-beds by dredging, and stored in pits provided with sluices. The shells commonly become green after storage. Oysters from the pits are in better condition than those fresh from the beds. After six or eight weeks' captivity and feeding they attain perfection. An oyster is in its prime when about eighteen months old. The small "native" oyster is the most esteemed. The contents of a dozen pairs of shells, fluid included, should not weigh more than four ounces. The soft part of the oyster is the liver, the hard part is the muscle. Oysters should not be sold unless they are alive. Ordinarily on death the muscle binding the shells together is relaxed and the shells open.

Late in 1896 the Local Government Board issued a report and papers, submitted by the Board's Medical Officer, on the cultivation and storage of oysters and other molluscs in relation to the occurrence of disease in man. The papers are full of information on this important subject, and in the report the information is discussed and summarised. The evidence brought forward supports the view that while the

oyster trade of certain places is carried on under conditions involving risk of the fouling of the shell-fish with the excreta of persons suffering from cholera, typhoid fever, and similar diseases, so long will their use as an article of diet tend to produce these diseases. It follows also that when other molluscs than oysters are used for human consumption in much the same way as oysters, that which applies to oyster culture applies to them. Very largely for purposes of convenience, especially in the matters of accessibility, and of the facility for procuring labour at a reasonable cost, the cultivation of the oyster is carried on at points along our coast which are near to towns or villages, and a special preference is given, especially during the latter stages of its growth, to river estuaries and their neighbourhood. In such localities there are commonly sewer outfalls, hence the risk. However, the risk of fouling or specific infection of oysters is usually of much more pressing importance as regards the parts of "layings" used for fattening beds, and as regards ponds and pits resorted to for storage purposes, than it is as regards other "layings," where oysters are laid for further growth and development, and from which they are not taken direct to market.

There is nothing in the report or papers to warrant the opinion that English oyster fisheries compare unfavourably, in point of risk of sewage contamination, with those of foreign nations, from whose shores there is considerable importation into this country. The evidence, so far as it goes, does not support any such view. Some of the principal English layings, beds, and ponds are above suspicion in this respect; on the other hand, arrangements for the culture and storage of oysters in certain places on the Continent and in the United States have been shown to be bad, and cases of typhoid fever have been traced thereto.

Oysters are regarded as out of season in May, June, July, and August; that is, during these months oysters in our waters are either shedding their spawn, preparing to do so, or recovering from the effects of having done so. The times at which oysters reproduce their species vary considerably in different places and in different years; but September should be added to the four months named to cover the actual spatting season, as regards oysters in this country. The protection afforded by law to breeding oysters is much more limited in extent. Between May 14th and August 4th native oysters from our shores are precluded from being sold for food; and a similar restriction obtains for what are known as "deep-sea oysters" between June 14th and August 4th. However, the close season laid down by the Act of 1877 does not apply, *inter alia*, to oysters taken in the waters of a foreign State; thus during this period such oysters as can be directly imported may be freely sold for consumption. Oysters imported from abroad and laid down in British waters for a period even as long as four months do not come within the restrictions of the Act in question. The outcome in practice is that oysters, native or foreign, are sold and consumed all the year round.

Lobsters and Crabs cast their shells annually, and just before doing so are in poor health, but they are never out of season. They are sometimes sold alive, but generally ready cooked. They are caught in basket-work "pots" sunk at sea, and may remain alive for months in these pots, with such food only as they can gather from the sea-water.

Under the provisions of the Crab and Lobster Act no crab may be offered for sale which is less than $4\frac{1}{4}$ inches across the back, and no lobster which is less than 8 inches

from back to tail when extended flat. No crab may be consigned for sale with spawn outside attached to its tail, but there is no similar restriction in the case of lobsters.

Prawns and Shrimps are taken in hand-driven nets in shallow water. They are always sold cooked. Prawns should boil bright red, and have no spawn under the tail. The shrimps usually sold boil brown. These are called "buntings." There is another kind of shrimp carrying a sword in its head, which boils red like a prawn. Prawns are sold by the dozen, and shrimps by the pint—about 320 shrimps go to a pint.

Whelks, Mussels, Cockles, and Periwinkles.—All these are sold by measure. Periwinkles count about 2000 to the peck, whelks (a larger kind of periwinkle) count about 112 to the peck. A peck of cockles contains about 1000, and a peck of mussels about 500. These shell-fish are sold raw or cooked, and their consumption is chiefly confined to the poor. They are usually cooked in their own liquor or in salt water, with vinegar added. Cockles should be well cooked, as otherwise they are capable of conveying enteric fever. The mussel has a bad reputation for occasionally causing symptoms of poisoning when eaten, especially in warm weather. This may be due to the mollusc feeding on something poisonous, or to the water from which it was taken being foul or poisonous; but sometimes a special poison appears to be developed in the liver. Certainly mussels to all appearance fresh and wholesome may cause poisoning.

In view of this, mussel consumers should be careful to see that the mollusc is as fresh as possible, from a clean source, and thoroughly cooked. There is considerable safety in efficient cooking. Merely pouring boiling water over a pile of mussels or other shell-fish does not make sure

that any harmful organisms they may contain are rendered harmless. If risk is to be avoided, cooking must be very complete.

Unseasonable and Immature Mussels.—Byelaws for regulating sea fisheries, made under Sea Fisheries Regulation Acts, 1888 to 1894, ordinarily require that—

1. No person shall take mussels during the months of May, June, July, or August, in any year.

2. No person shall receive from a sea fishery any mussel less than $2\frac{1}{4}$ inches in length.

Immature Cockles.—It is commonly held that no cockle should be taken which would pass (without pressure) through a square gauge of $\frac{1}{8}$ of an inch each side of the square, or $3\frac{1}{4}$ inches round the four sides.¹

¹ The Worshipful Company of Fishmongers, London, are willing to assist Local Authorities as regards fish inspection and prosecutions. They are also prepared to advise Local Sanitary Authorities and their officials as to fish unfit for consumption. The Company would, doubtless, be also willing to give facilities to meat inspectors to study the subject of fish inspection under the Company's Inspectors at Billingsgate Market. Application for such instruction should be made direct to the Clerk of the Company, Fishmongers' Hall, London.

CHAPTER X

FRUIT AND VEGETABLES

No proper dividing line between them—Fruit ordinarily exposed for sale—When in season—Apples, pears, and oranges—Apples spoiled by larva of codling moth and larva of apple saw-fly—"Brown rot of fruit"—"Black spot" on apples and pears—Barrelled grapes—Cherries, apricots, nectarines, and peaches—Damsons—Greengages—Orleans plums, magnum bonums—Currants, raspberries, strawberries, gooseberries, and rhubarb—Disease, decay, and immaturity—Nuts—Walnuts, hazel-nuts, etc., the nut-weevil, Brazil nuts, pea-nuts, almonds, sweet chestnuts, cocoanuts—Dried fruit, crystallised fruit, bottled fruit and jams—Vegetables ordinarily exposed for sale—When in season—Potatoes—Diseases to which potatoes are liable—Artichokes—Asparagus—Asparagus beetle and asparagus fly, and their larvæ—Beans—Bean beetle, black fly, etc.—Broccoli and cauliflower—Cabbage—"Black rot" of cabbages—Sauerkraut—Carrots, parsnips, and beetroot—Celery and celeriac—Cucumber—Endive—Lettuce—Horseradish—Mushrooms—Disease of mushrooms—Onions—Onion fly—Green peas, dried peas—Sea-kale—Spinach—Tomatoes—Diseases of tomatoes—Truffles—Turnips—Diseases of turnips—Turnip-gall—Vegetable marrow—Disease, decay, etc.—Tinned fruit and vegetables.

THERE is no dividing line marking off fruit from vegetables. For instance, from custom rhubarb is sold and used as a fruit, which it is not; while, on the other hand, the tomato, obviously a fruit, is conventionally classed among vegetables.

Fruit literally means something which is enjoyed, and may be defined as the produce of a tree or plant containing the seed.

Nearly all kinds of ripe fruit used for food of man are wholesome raw. Many fruits intended for cooking or to be kept some time are purposely gathered in an unripe state.

The kinds of fruit ordinarily exposed for sale in the food markets in this country, and the time of year when they may be considered in season, are given in the following table. Lemons are not included in the list, for they are imported nearly all the year round, keep well, and are always to be obtained sound. Almost the same may be said of pines, nearly all of which are imported; but they require much greater care in keeping. Bananas, too, are imported nearly all the year round, and keep with care, so as to be

Fruit.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Apples . .	in	in	in	..	..	..	..	in	in	in	in	in
Apricots.	in	in	in	..	..
Cherries	in	in	in	..	..	..
Currants	in	in	in	..	..	..	..
Damsons	in	in	..	..
Gooseberries	in	in	in	..	..	..	..	..
Grapes	in	in	in	in	..	..
Green figs	in	in	..	..
Greengages.	in	in	in	..	..	..
Melons	in	in	in	in	..	..
Nectarines	in	in	..	..	..
Oranges .	in	in	in	in	in	..	..	..	..	..	in	in
Peaches	in	in	..	..	..
Pears . .	in	in	..	..	..	..	..	in	in	in	in	in
Plums	in	in	in	..	..
Quinces	in	in	in	..	..
Raspberries.	in	in	in	..	..	..	..
Rhubarb	in	in	in	..	..	..	..	..	..	..
Strawberries	in	in	in	..	..	..	..

rarely out of season. Bananas, like plantains, to which they are allied, are excellent food-stuff, and as cultivated are practically seedless.

Of the three winter fruits, **apples**, **pears**, and **oranges**, the two first are indigenous to this country. Crab-apples still grow wild in many parts, and are sold in the markets for flavouring and making jelly. Most apples and pears ripen best after gathering. Apples should be stored on shelves or trays in a room carefully ventilated, but not too dry. The temperature should be equable and rather low. Pears often do better hung up. The storing place should be well shaded, dry, and provided with some arrangement for heating. In an unwarmed room, during severe weather, the fruit is apt to get frost-bitten.

Nearly all the oranges imported are gathered unripe, or they would not keep. Pears are imported from many European countries, and early apples. A very large supply of apples comes from America¹ and Canada, and an increasing quantity is arriving yearly from Australia, New Zealand, California and South Africa. To the winter fresh fruits may be added **barrelled grapes**, which are imported in enormous quantities and last till spring. They keep well in the sawdust or fragments of cork in which they are packed.

Stone fruit naturally divides into three groups—cherries, high-priced large fruit, and plums. The cherries, of which numerous species are grown and imported, are of all stone-fruit most liable to be badly bruised. The cheaper kinds, such as “black hearts,” are often offered for sale by street

¹ Some years ago large quantities of apples were seized by the New York Board of Health and destroyed, on the testimony of official analysis that they were poisonous and dangerous to eat as food, owing to the practice of spraying with a liquid containing a preparation of arsenic to destroy the codling moth or its larvæ.

vendors in a state of decomposition. The second group—apricots, nectarines, and peaches—usually grown as wall fruit, requires much more care in cultivation, and, as it commands a good price, is rarely offered for sale in a damaged state. The third group—plums—includes the damson, or plum of Damascus; the greengage, brought to England by a member of the Gage family from the monastery of Chartreuse; the Orleans plum, coming from France, as its name signifies; the magnum bonum, so called because it is the largest English plum; and many others. These are commonly gathered before they are quite ripe, and consequently less liable to be bruised in packing and sorting. All plums are acid, and liable to disagree with the eater unless quite ripe; all are wholesome when cooked.

Large quantities of garden summer fruit, **currants**, **raspberries**, and **strawberries**, are imported in the spring from the Continent. Early **gooseberries** and **rhubarb** are also imported for two months before the home produce is ready. Though strawberries do not appear more liable to damage than currants or raspberries, a very large proportion is spoiled. They are bruised and crushed and left in the sun till many decompose, and sometimes fermentation is set up.

Though the fruit supply is so extensively augmented from abroad, the finest of all kinds (excepting, perhaps, oranges and lemons) for quality and flavour are English-grown.

Fruit may be the subject of disease, or in a state of decay, or it may be so immature (especially in the case of early windfall apples) as to justify seizure. Diseased or decaying fruit is known by softening, change of colour, and external mould. Fruit may be bird-bitten or insect-bitten,



FIG. 66.—Apple spoiled by larva of saw-fly, and magnified larva.

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and none the worse except that it is disfigured. However, much damage is done to apples, and sometimes to pears, by the **caterpillar of the codling moth**, and to plums by the red grub. A cut apple, with the larva of the codling moth *in situ*, is shown in Fig. 65. The larva has sixteen legs, a light brown head, and light pink body, marked with black lines and spots. The **larva of the apple saw-fly** also does much injury, especially to young apples. This caterpillar

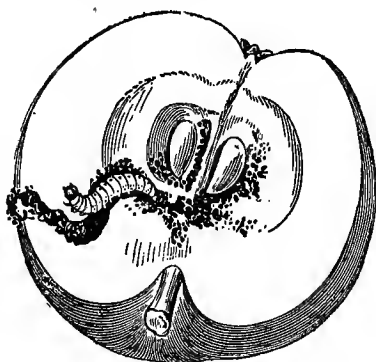


FIG. 65.—Larva of codling moth in apple.

is white or cream-coloured. When first hatched it has a black head and a black plate at the tail end, but later the head becomes red-brown and the plate greyish. The caterpillar has twenty legs, and when full grown is half an inch long. Fig. 66 shows a young apple hollowed out on one side and pierced, with two of the larvæ.

Yet another very damaging disease, attacking apples, crab-apples, pears, plums, cherries, and peaches, is that called "**brown rot of fruit.**" Brownish, scattered patches appear on the skin, followed by the growth of dull-grey tufts (the *moilia fungus*), which is usually arranged in



FIG. 67.—Apple affected with “brown rot of fruit.”

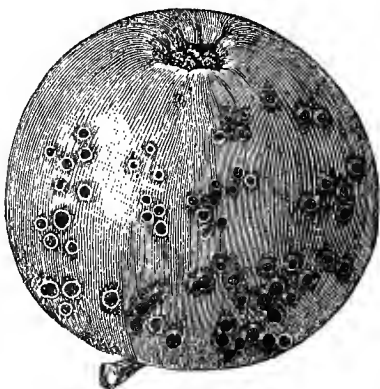


FIG. 68.—Apple affected with “black spot.”



FIG. 69. — Pear affected with “black spot.”

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irregular concentric rings. The tufts are composed of dense masses of spores in branched chains. Fig. 67 shows an apple affected with brown rot. The concentric rings of the fungus are well marked.

The "**black spot**" seen on the outside of apples and pears is due to the presence of a fungus, and disfigures the fruit. It appears first on the leaves and young shoots, from which the spores are washed by rain over the fruit, and attack it. When the fruit is nearly full grown before it is infected, the spots formed by the fungus remain fairly small, and such fruit is not materially injured, the spots being quite superficial. However, when young fruit becomes infected, its growth and development are checked, many of the spots are larger, and the fruit at a later stage is irregularly cracked. Fig. 68 shows an apple infected with this fungus, and yet not materially injured. Fig. 69 shows a pear infected when quite young, the development of the fruit having been interfered with, and the irregular cracks making it quite unsaleable.

This disease is also called "**apple and pear scab**." The fungi causing it in apples and pears respectively are different species, but they are very closely allied, and the general appearance of the disease is in each case identical.

"Black spot" or "scab" is probably the most widely distributed of fungus diseases attacking apples and pears. The fungus continues to spread after the fruit is gathered and stored.

Nuts ordinarily exposed for sale in this country are the walnut, several varieties of hazel-nut (including the filbert), the Brazil nut, pea-nuts, almonds, the sweet chestnut, and the cocoanut.

Walnuts are largely grown in England, though they originally came from the East. They are gathered in

September, and remain "new" till the end of January. For pickling, the walnut fruit is used when green, before the shell hardens. The fresh walnut is wholesome, but as it contains much oil, which is apt to become rancid, old walnuts are often unwholesome.

The wild hazel-nut and the cultivated filbert, the "black Spanish" nut, the Barcelona nut (said to be kiln-dried), and the cob-nut are closely related. Filberts are grown for the most part in Kent and the neighbourhood. They are more

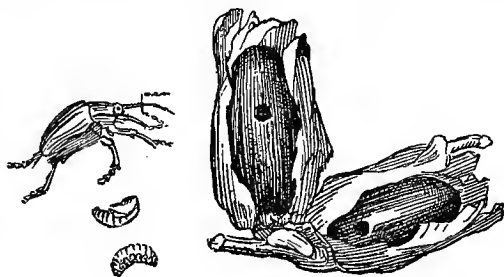


FIG. 70.

wholesome and free from oil than other nuts of the kind, and are considered to be in season from September to March.

Filberts and other nuts are liable to be spoiled by the nut-weevil. This little beetle has a long snout, and the female appears to eat a small hole in the young nut, while the integuments are soft. Here she deposits an egg, and the little white maggot, when hatched, eats its way into the nut, where it remains until it has arrived at maturity. It then eats its way out, and falls to the ground, into which it burrows, and undergoes transformation in due course. The nut-weevil is from a quarter of an inch to half an inch in length. Fig. 70 shows this weevil magnified, its pupa and maggot of the natural size, and two spoiled filberts.

Brazil nuts are not borne singly, but packed to the number of twelve to twenty in a woody capsule. These long, irregular, three-cornered nuts have a hard, close shell, and consequently keep better than walnuts, but they contain a large quantity of oil, which is liable to become rancid and render the nuts unwholesome.

Pea-nuts, which in recent years have been very largely imported, appear to keep well, but having thin shells should not be much exposed to the sun. They are sometimes sold roasted.

Chestnuts and almonds are really useful food, and might be used in place of bread or potatoes. Chestnuts are much improved by being cooked, and often sold thus. Almonds, though they contain much oil, keep fairly well. The best sweet almonds are Jordan almonds, imported from Malaga. They are longer and narrower and better-flavoured than the Valentia almonds. The bitter almond, owing to the prussic acid it contains, is seldom used except as a flavouring. Sweet almonds are often not distinguishable from bitter almonds except by the taste.

Cocanut is also an excellent food, and seems little liable to change; even after the nut is broken the solid part keeps well for any reasonable time.

Preserved fruit includes dried fruit, crystallised fruit, bottled or canned fruit, and jams.

The most familiar kinds of dried fruit are Malaga raisins, called muscatels, a dessert fruit; Valencia raisins, used for puddings; sultana raisins, used for puddings, and made from a small, light-coloured, stoneless grape growing in Smyrna, etc.; and grocers' currants, sometimes called Zante currants, prepared from the small black Corinth grape. There are also many qualities of prunes, French plums, figs, and dates, Normandy pippins, and dried American apples,

pears, and apricots. All dried fruits keep well, but raisins and currants, if damaged with moisture, are liable to ferment.

Crystallised or candied fruit is for the most part imported, but an increasing quantity is being made in this country. Almost every kind of fruit is preserved in this way, and some, like the almond fruit (similar to an unripe peach), is available for eating in this way only. All candied fruit, except candied citron and lemon peel, is used without further cooking. Fruit preserved thus keeps well.

Gooseberries, currants, raspberries, and plums, and all fruits used for pies and puddings, are preserved for winter use by the simple process of bottling. Occasionally a little sugar is added, but the approved plan is simply to bottle the fruit, covering it with water, heat it sufficiently, and exclude the air. Bottled fruit keeps well in a cool place if properly sealed. The process of canning is similar.

Fruit carefully preserved as jam or marmalade, if sufficiently cooked, should keep well from one fruit season to another. Sometimes, however, the top covers with mould, and sometimes fermentation is set up. Jam is specially liable to get bad if kept for several years or exposed in sunny shop windows. Jam should contain only fruit and sugar; occasionally it is necessary to add a little water. Marmalade and fruit jellies probably always contain some water. Of late it has become the practice of some manufacturers to add a little salicylic acid, but not more than one grain per pound of this is allowable, as a preservative. When several grains are added, the object may be to mask bad fruit, or enable the manufacturer to use less sugar, and to add a considerable quantity of water.

Vegetables may be conveniently defined as plants culti-

vated for culinary purposes. The kinds ordinarily exposed for sale in the food markets in this country, and the time of year when they may be considered in season, are given in the following table.

Potatoes are by far the most important of all vegetables as a food-stuff. When new, as shown in the table, they are in season in the spring and early summer. When mature they keep well all the year round.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Artichokes .	..	..	..	..	..	..	in	in	in	..	..	..
Jerusalem ditto .	in	in	in	in	in	in	..	..	in	in	in	in
Asparagus .	fd	fd	fd	fd	in	in	in	..	..	..	..	..
Beans, broad	..	..	..	..	..	..	in	in	..	..	..	..
,, French	..	fd	fd	fd	fd	fd	in	in	in	..	..	..
,, haricot	in	in	in	..	..	..	..	..	..	in	in	in
Broccoli .	in	in	in	..	..	..	..	..	..	in	in	in
Brussels sprouts .	in	in	in	..	..	..	..	..	..	in	in	in
Carrots, young	..	..	..	in	in	in	..	..	..	..	in	in
Cauliflower .	..	..	..	..	..	in	in	in	in	..	..	..
Celery .	in	in	in	in	..	..	..	..	..	in	in	in
Cucumber .	..	..	fd	fd	fd	fd	in	in	in	in	..	..
Endive .	in	in	in	..	..	..	..	..	..	..	in	in
Horse-radish .	in	in	in	in	in	in	..	..	..	in	in	in
Lettuce .	..	..	in	in	in	in	in	in	in	in	in	in
Mushrooms .	fd	fd	fd	fd	fd	fd	fd	fd	in	in	fd	fd
Parsnips .	in	in	in	in	in	..	..	..	..	in	in	in
Peas, green .	..	..	..	..	..	in	in	in	..	..	..	..
Potatoes, new	..	..	fd	fd	in	in	..	..	..	..	..	..
Sea-kale .	..	in	in	in	in	in	..	..	..	..	..	..
Spanish onions	in	..	..	..	..	..	..	..	in	in	in	in
Spinach .	..	..	in	in	in	in	in	..	..	..	..	..
,, winter	in	in	..	..	..	..	..	..	..	in	in	in
Tomatoes .	..	..	..	fd	fd	fd	fd	in	in	in	..	..
Truffles .	in	in	in	..	..	..	..	..	..	..	in	in
Turnips, young	..	..	..	in	in	in	..	..	..	..	..	..
Turnip greens .	..	..	in	in	in	..	..	..	..	..	..	..
Vegetable marrow	..	..	..	..	..	..	in	in	in	..	..	..

“fd” stands for forced.

Good potatoes should be of dwarf and neat appearance when growing, the haulm (or stalk) being strong and branching. The tubers of the most approved varieties are long, oval, or kidney-shaped, fairly symmetrical, smooth in the skin, and with few eyes. The flesh should be pale and uniform in colour, fine-grained, and very firm, and the juice should be acid. The potato should be dry and floury when cooked, and of good flavour. Inferior potatoes are best known by their lightness; thus, a potato with a specific gravity of less than 1068 deg. may be regarded as bad.

Potatoes green on one side, from exposure to the air and sun when growing, are usually considered unwholesome. Potatoes, stored for the winter, must be put in a cool and dry place, or they will sprout, and must be protected from the cold, or they might get frost-bitten.

The sweet potato, so much in favour in America, is rarely seen in this country.

Diseases to which Potatoes are liable.—These are many; the more important are:—

The potato disease.

Disease associated with the Colorado beetle.

Black leg, or potato stem-rot.

Potato leaf-curl.

Potato scab.

Wart disease (black scab).

Corky scab of potatoes, and winter-rot of potatoes.

These may be very briefly described.

The Potato disease.—This is well termed by farmers *the potato disease*, as it has in the past been the cause of enormous loss, and yet gives much trouble to potato growers from time to time. The first sign is the presence of yellowish spots on the leaves. The spots gradually

increase in size and become brown, and then the leaves curl. The under surface of the curled leaf, on being examined by a magnifying glass, shows the fruiting branches of the fungus, forming a delicate white mould. The minute spores of the fungus are exceedingly numerous, and scattered by the wind, by ground game, or otherwise. The spores falling to the ground are washed through the soil by the rain, and may infect young potatoes. It is probable, also, that the mycelium of the fungus passes down diseased stems into young potatoes. If the season be wet and warm, the mycelium in the potato continues to grow, soon causing brown spots to appear, and ending in the rotting of the tuber.

Disease associated with the Colorado beetle.—

In 1874 the Colorado beetle, so long known in America, had travelled eastward as far as the Atlantic. Later it obtained a footing in England and the Continent of Europe. The principal food of this beetle is the cultivated potato plant; tomato plants are also attacked; oats, red currants, etc. In 1901 at Tilbury Docks allotments of cabbages were attacked by the beetle. A potato plant attacked may produce tubers, but they are probably small and poor in quality.

Black leg or Potato stem-rot.—This disease, though known for some time on the Continent, is little known here. There is reason, however, to think that it is spreading in this country. It is very destructive. The leaves of the plant wilt and turn yellow, then they become shrivelled from below upward, and finally die. If the underground portion of the stem be examined when the leaves begin to droop, its surface will be found more or less covered with brownish stains. This discoloration gradually extends up the stem, which finally becomes black and rotten

throughout. The disease is due to the *bacillus phytophthorus*. The tubers become infected by the bacilli which have been washed into the soil from the rotten haulms. In the tuber the cause of disease may enter at a minute wound, and from this a rapid browning of the mass starts.

Potato leaf-curl.—This disease is widely diffused. In addition to Britain it occurs on the Continent, and is rampant in the United States. The foliage of the plant is small, and the leaflets are much curled, while the haulm is more or less stunted. The fungus is perennial, and the plant is infected either by the hibernating mycelium passing directly from the tuber, or by means of spores present in the soil, which infect the young sprouts. In either case the arrest of growth and the curling of the leaves is due to the ascent of water and food being checked by the upward growth of the fungus mycelium in the tissues of the haulm. As the mycelium increases in quantity the haulm becomes limp and collapses, owing to the lack of water. Tubers which give origin to curled foliage do not decay, but remain firm and hard. It seems that the mycelium only passes from the haulm into the tubers during the last stages of growth, and suggests that tubers intended for "seed" should be lifted before they have completed their growth.

Potato scab.—One of the most widespread diseases affecting potatoes is *Dosporon scabius*. A representation of a scabbed potato is given in Fig. 71, and from this it may be easily identified.

The fungus usually begins its attack on a tuber while young, scattered rough patches, or scabs, being found on the surface.

These patches gradually increase in size and number, and not uncommonly when the tuber is full grown its surface

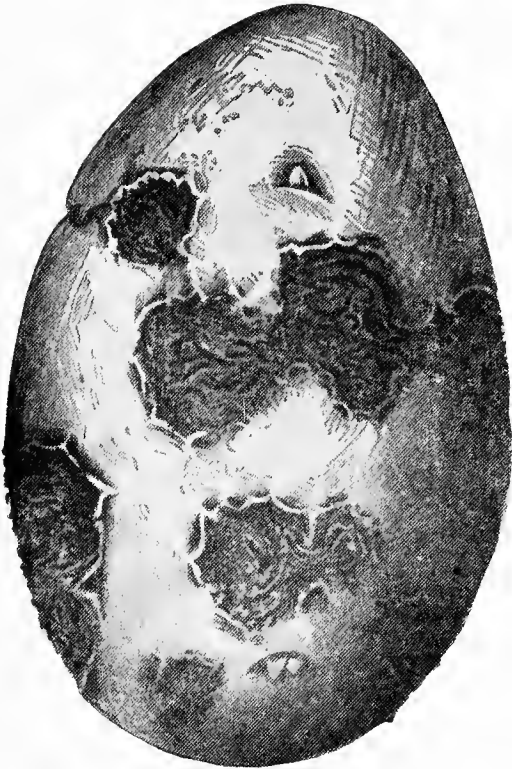


FIG. 71.—Scabbed potato.

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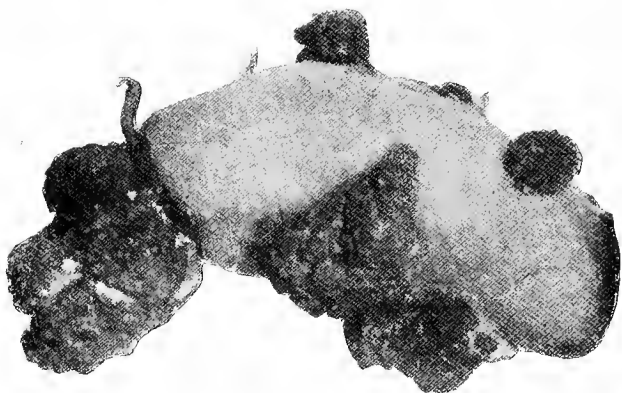


FIG. 72.—Potato affected with “wart disease.”



SCAB DUE TO *Spongospora scabies*, Mass.

FIG. 73.—Potatoes affected with “corky scab.”

To face page 202.

is almost completely covered with scab. The injury done is limited to the surface of the tuber, the skin being broken up into fragments over the diseased patches. When scab is present in quantity the market value is, of course, much depreciated, but the quality of the potato is not in the least impaired for eating.

Wart disease (black scab).—This disease affects the tubers and haulms of potatoes, giving rise to large irregular outgrowths, which resemble pieces of cauliflower covered with mud. It has many names, among which are—cauliflower disease, canker, and “fungus.” Though black scab is one of the names by which this disease is known, it is not in any way related to the other black scab already described. However, both diseases are frequently present on the same plant.

Warts, or wrinkles, appear at first near the eyes of young potatoes, and later several warts by growing together form a brown spongy scab which finally becomes black.

The appearance of a tuber attacked with this disease is well shown in Fig. 72. There have been many cases since 1901.

“Corky scab” of Potatoes.—The parasite producing this disease is a member of the numerically small but cosmopolitan group of organisms known as Myxogastres, which are still retained amongst Cryptogams, and are either included in the fungi, or regarded as a satellite of that group. The name given this parasite is *Spongospora scabies*.

The parts of the tubers which are not actually attacked remain sound, but all tubers affected are rendered unsaleable.

The disease gets its name from the wound-cork around the injured portions of the potato. In the early stages, small, dark-coloured, slightly raised patches appear on the

surface of the tuber, and later the characteristic "scab" as in Fig. 73. When the vegetative phase of the disease has been completed, and the formation of the spores has commenced, the skin of the raised blister is ruptured, and a dense mass of brownish spore-balls is exposed.

Winter-rot of Potatoes.—This fungus is one of the commonest diseases of potatoes. It attacks store potatoes, and is always present to some extent, but usually only reaches the proportions of an epidemic during hot dry seasons, which favour the rapid development and spread of the fungus. The tubers alone are attacked. They are inoculated with spores present in the soil. Though this inoculation takes place when the tubers are young, as a rule the disease is not obvious when the tubers are lifted, although the mycelium of the fungus is present in the tissues. If the potatoes are kept dry and exposed to the air no further development takes place. On the other hand, if they are stored or placed in heaps so that air is practically excluded, and especially if stored before being perfectly dry, sweating takes place, the temperature is raised, and in a few weeks the mycelium present in the tubers begins to grow.

The first external indication of disease is the gradual depression and shrivelling of a portion of the surface of the tuber; these sunken portions are soon covered more or less with white patches of the fungus, bearing myriads of spores, which are quickly distributed by mites and other minute creatures.

At a later stage the white tufts change to a pale pink colour, and produce a second crop of spores, which in like manner are distributed through the heap of potatoes by mites, etc. In this way the disease quickly spreads, and, aided by bacteria, the tubers are soon reduced to soft foetid masses, the skins alone remaining intact.



FIG. 74.—Potatoes affected with “winter rot.”

During the following season the most perfect stage of the fungus, in the form of minute crimson red points, develops on the skin of diseased tubers. The spores of this stage germinate in the soil, and infect future crops.

The two store potatoes figured indicate the appearance of this disease.

Artichokes.—Two varieties of this vegetable are ordinarily seen in the markets when in season—the green and the purple, the latter being sometimes known as the French artichoke. The head should be fresh-looking, firm, well rounded, and of good flavour. It is better for being gathered two or three days. The Jerusalem artichoke is quite a different vegetable, not produced from seed, but from roots. The part used is not the flower-head, but the tuber. It comes in as its more esteemed namesake goes out, and continues in season the remainder of the year.

Asparagus.—This vegetable is largely imported from France, especially the “giant” varieties. It is a native of Great Britain and easily grown, the best soil being a light sandy loam. It is sown in March, and ready for cutting in 26 months. It should be firm and white in the stalk, and have a deep-green, compact crown.

This vegetable is subject to injury by the asparagus beetle and the asparagus fly.

The asparagus beetle and its larva bite the tender asparagus heads, making brown patches upon them. The beetles defile the heads with masses of sticky eggs; the heads also get covered with a brown-black sticky fluid emitted by the larvæ. Later on the beetles and larvæ eat the large round seeds. Plants may be completely denuded of their foliage. Now and then the beetles gnaw the shoots underground.

The asparagus fly and its larva do possibly more

damage. The beetle larva is only about a sixth of an inch long; the fly larva is half an inch long. The flies, issuing from early in April onwards till about the middle of July, lay their eggs beneath the scales of the asparagus heads, as they are appearing through the soil, or in the neighbourhood of the leaves on the tall stems. The larvæ hatch out and bore into the stalks and young shoots, feeding in a downward course, their presence being marked by yellowish tunnels. The affected shoots become brownish or yellow, stunted, and in time decompose.

Beans are of great nutritious value, especially haricot beans, which are gathered ripe. The haricot bean should be firm and full, the skin being smooth and white.

Broad beans are gathered when the beans are nearly mature but unripe. The ordinary varieties are the "long-pod," usually containing seven or eight beans, and the short, containing from three to five. The beans should be broad, kidney-shaped, flattened or concave at the sides, and in colour chocolate or greeny-brown.

French beans are gathered quite immature, the pod forming the bulk of the food-stuff. The pod should be long, tender, and fleshy, and comparatively free from stringiness.

Beans are attacked when growing, and when stored, by a weevil (the bean beetle), the grub of which may often be seen in the bean.

The thrips fly, or black fly, also attacks the blossoms, causing the pods to be checked in their development.

The pods of scarlet runners and French beans suffer considerably in this country from the attacks of a parasite producing a disease known as bean-pod canker.

Broccoli and Cauliflower should have large, white, compact heads. Any tinge of yellow or green generally indicates



FIG. 75.—“Black rot” of cabbages. Cross section of stem.

an inferior quality. Broccoli sprouts are purple in colour, and not compact in the head. Broccoli are "in" during winter and spring; cauliflowers during summer and autumn.

Cabbage, in one or other of its varieties, is in season all the year round. The small cabbage known as the "Savoy" is usually in good condition from May to August. Brussels sprouts are in season all through the winter. A good cabbage should be crisp and firm, and "heart" well. Borecole, or kale, and curled greens are excellent for winter use, some being hardy enough to stand the severest frost. There are many varieties of pickling cabbage, deep red and purple, with compact heads, or rosette-shaped, and in various sizes.

Cabbages, broccoli, and cauliflowers are much damaged by the larvæ of three kinds of white butterfly, and the cabbage moth and turnip moth; and also impoverished by plant lice and many fungus parasites.

Black rot of Cabbages.—Cabbages are also subject to a disease known as "black rot." The lower leaves are usually infected first, the germs entering the substance of the leaf through minute openings situated along the margin, or through wounds caused by the punctures of insects, etc. In cases where the root is infected, the germs may gain an entrance to the plant through broken roots at the time of transplanting. When the bacteria are once inside the leaf they multiply rapidly, and are confined to the veins, from whence they pass down the leaf-stalk into the stem. From the stem they quickly pass into the stalks of other leaves, so that within a short time every leaf is infected. As the bacteria travel along the veins and the vascular bundles of the leaf-stalks and stem, a dark-brown or blackish substance is deposited, which causes the veins to show up as a black network; the vascular bundles of the leaf-stalk and the

stem also appear as black points or a blackened ring when cut across. The presence of this blackening of the veins is a certain indication of the presence of the disease.

Sauerkraut, now often sold in grocers' shops, etc., is prepared in Germany from ordinary full-sized heads of cabbage. The heads are cut in the late autumn, stripped of their outer leaves, and packed closely in layers in a hole in the ground, the hole being lined with dry garden leaves. Earth is filled in at the top to shut out the air, and if this be not heavy enough, a flag-stone or weighted board is added. In the course of a few months the cabbages are entirely changed, and are light brown through to the cores. They are then taken up and packed in barrels with salt, and in a short time are ready for export as **sauerkraut**. The change in the cabbages is similar to that which takes place in grass packed in a silo, and is of the nature of acid fermentation.

Carrots, Parsnips, and Beetroot are distinguished among vegetables for their richness in sugar. Bread has been made from all of them. When in great abundance they are sometimes used in distilleries for making spirits.

Carrots should be light red or yellow, of a regular conical shape, sweet and crisp. Young carrots are more tender and are preferred for the table. They are in season from April till June.

Parsnips should be buff in colour, unforked in the roots, sweet and crisp. They are in season winter and spring. They should be stored in dry sand.

Beetroot should be deep red or purple, of a long oval or globular shape, fine-grained, sweet and delicate in flavour. It keeps well in dry sand, and is always seasonable.

The larvæ of the carrot-fly burrow into and spoil carrots and parsnips, often causing them to shrivel. A mildew

also attacks parsnip roots. Beetroot is liable to be damaged by a nematode—the male of which is like a worm, the female lemon-shaped.

Celery should be nearly white in colour, large, crisp, solid,



FIG. 76.—The celeriac.

and nutty in flavour. It is in season in winter and spring. It is fit for use for some time after being gathered. There is a variety of celery in which the root is large and turnip-shaped. This has been called **celeriac**. It is depicted in Fig. 76. All varieties are eaten raw or cooked.

Much damage is done to the plant by the larvæ of the

"celery-stem fly," by a fungus known as "red rust," and by "black mildew."

Cucumber should be regular in shape, smooth in the skin, dark green in colour (some varieties light green), white-fleshed and delicate in flavour. It is in season spring, summer, and autumn.

Endive is a sort of winter lettuce, and should be crisp and succulent. When carefully tied 'up it blanches well. It is ordinarily used as a salad and garnish. It requires much cleansing, as insects find their way right into the heart.

Lettuce is ordinarily in season from March to September, but some varieties of both cos and cabbage are seasonable in winter. The head should be close and compact, and the leaves should be crisp and sweet. When the lettuce is too young, or running to seed, the flavour is bitter.

Mildew often attacks the leaves. Its presence is indicated by pale patches, and it soon causes putrefaction.

Horse-radish.—This garden root is usually scraped raw, and used as a condiment and garnish. It is in season from October to June. There seems to be some risk of aconite root (a poison) being mistaken for horse-radish. Horse-radish (*vide* Fig. 77) is usually from 7 to 10 inches long, and as thick as a man's thumb for some distance down. It is yellowy-white outside. Aconite root is usually not half as long, not thicker than a finger, at the crown, and tapering. It is wrinkled, and blackish-brown in colour outside. A minute portion, cautiously chewed, causes prolonged tingling and numbness.

Mushrooms may be gathered in the fields (pastures) in September and October, and often earlier, while forced mushrooms can be obtained all the year round. There are many edible British species, for example, the common

mushroom, horse mushroom, tufted mushroom, parasol mushroom, and funnel mushroom: but only the two first

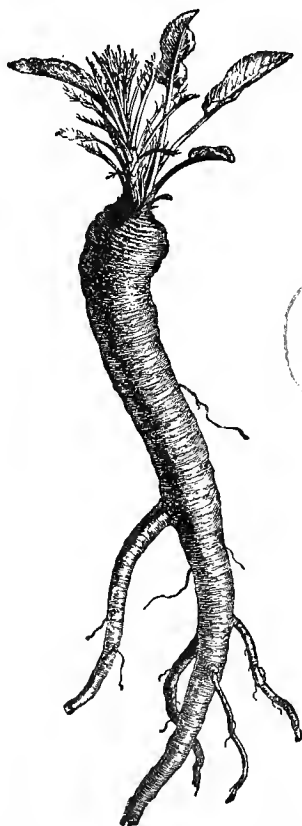


FIG. 77.—The horse-radish.

named are offered for sale in markets and shops, or by hawkers.

The common mushroom is like a small ball when young and in the "button" stage. It gradually expands until nearly flat, when it is white in colour, and 3 to 6 inches across. The flesh is thick, white, changing to dirty brown when cut or broken; gills crowded, rosy then dark brown, watery and deliquescent when old; stem stout, white, with a rim or frill near the top.

The mushroom commonly cultivated in this country is by some considered as a variety of the common field mushroom, differing from it in having the cap more or less covered with brown scales. In the cultivated form the aroma is not so pronounced as in the wild plant.

The horse mushroom is also ball-shaped when young, gradually expanding until almost flat, white in colour, but changing to primrose yellow when bruised, 4 to 6 inches across, but sometimes much larger; flesh white, not becoming brown when broken; gills brown, remaining dry when old; stem stout, white, with a broad frill. It differs from the common mushroom in the flesh not turning brown when broken, and in the gills remaining dry when old. There is a prejudice against this mushroom in many districts, but it is quite safe to eat, and is preferred by some to the common mushroom. Many tons are sold in London, and purchased presumably under the impression that it is the common mushroom.

Other edible Fungi.—There are many species of fungi besides mushrooms which may be safely eaten, and, fortunately, poisonous fungi are comparatively few in number.

Among the species more or less commonly found in Great Britain are the following: bleeding agaric, sheathed agaric, scaly agaric, chocolate agaric, amethyst agaric, shaggy cap, warty cap, blewits, horn-of-plenty, edible boletus,



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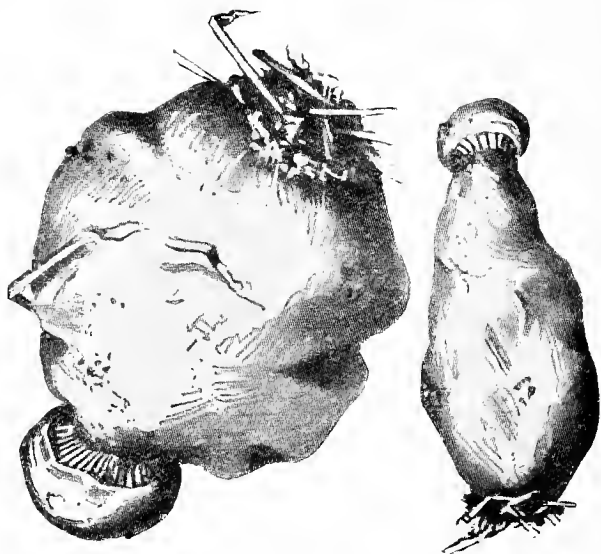


FIG. 78.—Mushrooms affected with disease. Stem much swollen, cap small and deformed, or absent.

giant puff-ball, and common morel. All these, except the two last named, would be popularly classed as toadstools.

Though many of these fungi are gathered and eaten by country folk, they do not appear to be sold or offered for sale.

A Mushroom disease.—During certain seasons cultivated mushrooms have been destroyed in a wholesale manner by a remarkable parasitic disease, which was only brought under observation some seven years ago. It has appeared not only in this country, but on the Continent, especially in the vicinity of Paris, where mushroom culture is conducted on a large scale. The cause of the disease is a minute fungus, which when once introduced spreads very quickly under the conditions of temperature essential for the rapid growth of mushrooms.

The mycelium of the parasite grows with the mushroom. The latter, instead of developing into a cap and stem, becomes an irregularly shaped monstrous soft mass, which may exceed the size of a full-grown mushroom. Sometimes a small deformed cap may be seen, but as a rule the entire mass of the diseased mushroom consists of a much enlarged stem. The appearance of infected mushrooms is shown in Fig. 78.

After a time the parasite produces its spores on the surface of the diseased mass, forming a snow-white velvety covering. These spores scatter, and the mushroom rapidly decays, and becomes a putrid mass having a pungent smell.

Onions are in season all the year; the imported Spanish onion from October to January only. Onions are grown in this country in great variety, the smallest being the silver-skinned ones used for pickling, the largest fully as big as the Spanish. The outside colour may be brown, red, yellow, white,

or light green. They are all possessed of an acrid volatile oil, irritating to the eyes, but, when boiled, should be mild in flavour. The bulbs should be symmetrical, well filled out, fine fleshed, and small in the neck. They should keep well.

Leek, garlic, and shallot all belong to the same genus.

Onion bulbs are attacked by eel-worms, the larvæ of the onion fly, "smut," mildew, and mould. When stored they are subject to putrefactive change, giving rise to a greenish slime on the surface.

The first indications of the attack of the "onion fly" are shown by the longest or first leaves of the onion plants becoming yellow, and afterwards whitish; if these leaves be pulled they easily come away from the stem, and gradually the other leaves become yellow and decay. The bulb will be found to be small and badly shaped, with dirty white maggots within its folds, feeding upon it, and eventually causing it to become rotten and useless.

Green Peas are cultivated in numerous varieties. They are in season in June, July, and August, and much earlier when forced. The plant should not grow high, and should begin podding near the ground. The haulm should be strong. The pod should be nearly straight and well filled to the end, containing from four to ten or eleven peas. The peas are wrinkled or smooth, grey, blue, or green according to variety.

Peas are attacked, when growing and when stored, by a weevil (the pea beetle), the grub of which feeds on the pea. The larvæ of the pea moth also spoil many peas. The pea is also attacked by the thrips fly, or black fly.

Dry Peas, on keeping, become pale, shrivelled, and hard; but they keep better thus than as pea-meal, which is very liable to become mouldy. Whole or in meal, peas are

susceptible to the attacks of insects. The *acarus*, a sort of itch insect, may be well defined with a pocket lens if present.

Sea-kale.—This plant is related to the asparagus, and derives its name from growing on certain seashores. It is easily cultivated from seed or roots. It is in season from February to June.

Spinach.—There are many varieties of this, the best known, perhaps, being the “round-leaved,” the “strawberry,” and the rapid-growing “New Zealand.” It is ordinarily in season from March to July. The “prickly,” or winter spinach, is in season from October to February. Spinach should be bright in colour, should last well, and not run to seed early. The leaves should be soft and succulent, and not stringy.

Tomatoes are cultivated in hot-houses and out of doors in this country; but large quantities are imported. They vary in colour from deep crimson to scarlet or yellow; in size, from that of a large apple to that of a cherry. Indeed, there is a currant tomato, producing bunches of fruit looking like fine red currants. Tomatoes are in season from August to October, and those grown under glass much earlier. The plant has an unpleasant odour.

Diseases of Tomatoes.—Tomato plants are liable to be attacked by several insects, including the Colorado beetle, which from time to time do much damage. There are, however, three diseases to which attention should be directed, viz.: black-stripe, sleepy disease, and a bacterial disease better known in France than in this country.

Black-stripe of Tomatoes.—This disease is sometimes called “black rot.” The fruit is most frequently attacked, discoloured patches appearing, which become slightly sunken owing to collapse of the tissues. Such

patches soon become covered with a delicate velvety pile of a blackish-olive colour. The fungus sometimes forms long, blackish stripes on the stem, and irregularly shaped blotches on the leaves.

Sleepy disease of Tomatoes.—The plant may be diseased when quite young, but the outward manifestations do not necessarily appear at once. The first indication that the tomato is affected is shown in the drooping of the leaves and their bad colour. If the root is split, the woody portion is seen to be of a dingy, yellowish-brown colour, which becomes more marked if left open for half a day. When the plant has been attacked about three weeks the lower portion of the stem is usually covered with a delicate white bloom of mildew. Eventually the stem is covered with patches of a dull orange colour, and becomes very much decayed. The disease can always be identified by a brownish ring just within the bark at the base of the stem or thicker branches of the root.

The disease is due to a fungus which flourishes in the soil and enters the plant by the root. During its development it passes through three stages, the first of which usually lasts about a week, the stem at the end of that time being much decayed and covered with a gelatinous mass. During the last stage the spores are resting and preparing to attack the young plants another year, or whenever a suitable opportunity presents itself. The plant can only be attacked by the fungus in the last stage of its existence.

Bacterial disease of Tomatoes.—The symptoms are very marked, and cannot be confounded with those of any other tomato disease at present known. When the tomato is about the size of a marble a minute blackish patch first appears at the base of the style. This patch gradually increases in size, retaining a circular outline,

until eventually the entire fruit is reduced to a blackish, soft, decayed mass.

Experiments have shown that infection takes place during the flowering stage, and that the bacteria causing the disease are deposited on the stigma by flies visiting the flowers.

Truffles are tubers, possessing an animal rather than a vegetable flavour; in this as in other aspects they somewhat resemble mushrooms. They are not subjected to regular culture, but grow some inches below the surface of the earth in damp, calcareous soils, especially in oak and chestnut forests. They are of irregular form, ordinarily the size of a walnut, but sometimes attaining to the size of a turkey's egg, and have a rough, brown, warty surface. There are at least three species, black, white, and red, but only the black is ordinarily seen. They grow in clusters without roots. They are found in parts of England (Hampshire, Wiltshire, and Kent, etc.); and in France, Italy, Spain, and Holland. Large quantities are imported from France, the best coming from Perigueux, and about Angoulême. They are seldom found twice in the same place, and they have to be scented out with the help of a pig or a trained dog. Truffles are in season from November to March. They should be light in proportion to their size, elastic when pressed, and of fine aroma. They are in use chiefly for seasoning and garnishing. When dried much of their aroma is lost. The best way of preserving them is to partially boil them in a tin, and then seal them up in their own diluted juice.

Turnips may be obtained all the year round, but young turnips (best suited for the table) are in season from April to June, and turnip-tops from March to May. The turnip should be regular in shape, firm-fleshed, white or yellow, and sweet. Turnip-tops should be bright green

in colour, fresh and tender. The swede, a large variety of turnip, is when young sometimes sold for the table.



FIG. 79.—The turnip.

Swedes are distinguished from other turnips by the leaves being smoother, and usually the swede has a neck at the top

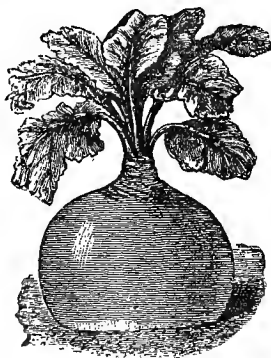


FIG. 80.—The swede.

of the root from which the leaves spring. Compare Fig. 79 (turnip) with Fig. 80 (swede). There is a kind of turnip,

the “navet,” which is light buff in colour, shaped like a carrot, and especially full-flavoured (see Fig. 81). It is much esteemed in France, and sometimes imported to this country.

Turnips are much injured by parasites. The larvæ of the

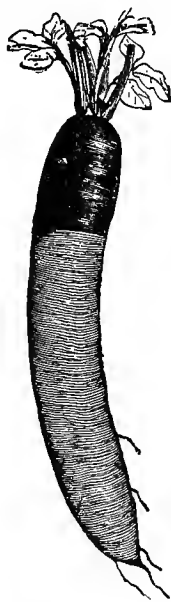


FIG. 81.—The navet.

turnip fly eat the leaves, and the larvæ of the turnip moth eat roots as well as leaves. “Gall” is caused by the turnip gall weevil—the female pierces the turnip and deposits an egg, the grub from which lives to maturity in the turnip, forming a swelling on the surface, called a gall. The surface of a single turnip may show many galls of various

sizes, as represented in Fig. 82. Swedes are also affected with "gall." Clubbed turnips—that is, roots disfigured with knobs—are ordinarily infested with the club-root fungus.

The bacterial disease already referred to as "black rot" of cabbages is also a disease of turnips.

Perhaps the insects which are most damaging to a turnip,

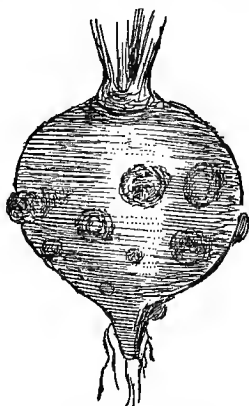


FIG. 82.—Turnip affected with "gall."

when they attack it, are turnip mud-beetles and grubs. The leaves are eaten, the leaf-stalks pierced with holes, and the root-tubers are irregularly gnawed and tunnelled on the surface, especially in the upper part. The harm is done by both beetle and grub. A favourite place for the pests is at the crown of the tuber sheltered amongst the leaf bases, the young leaves being destroyed as they come forward. Attacked leaves curl up, and attention may be drawn to the presence of the pest by the curled leaves standing straight up from the tuber and close together.

The holes made in the tuber afford entry to rain and fungous enemies, and the plants may die off.

Vegetable Marrows are grown in this country in many varieties, under glass and in the open garden. They should be young, quite firm, bright coloured, smooth on the surface, and of good flavour. They are in season in July, August, and September.

Marrows are subject to disease, or may be in a state of decay. The chief indications are softening, change of colour, and external mould.

Tinned Goods.—There is sufficient reason for believing that nearly all tinned fruit and vegetables are more or less contaminated with tin, the amount present being from one-tenth of a grain to over one grain per pound. Fortunately, this metal is not known to be poisonous, except in large doses. Green peas and French beans, and some other preserved green vegetables and pickles, are frequently deliberately adulterated with copper, which metal is undoubtedly injurious to the health of the consumer. The presence of copper can be detected by leaving the blade of a penknife in the liquor round the vegetables for a short time. Copper will deposit itself on the blade.

CHAPTER XI

CORN, BREAD, AND FLOUR

Corn, different kinds—How distinguished when ground—Diseases of corn: Bunt, Smut, and Ergot—Flour—Wheat flour—Varieties of wheat—Yield of a quarter of wheat—Good flour—Diseased, mouldy, damp, fermented, and decomposing flour—Adulteration with other flours or starch—Mineral adulterants—Readily applied test for presence of alum—Bread defined—Wholemeal bread—Good bread described—Sodden, sour, bitter, or mouldy bread—Adulteration of bread.

CORN is generally understood to include wheat, barley, oats, and rye. Maize and rice also come under the term "corn." It is by far the most important food substance in use in this country, and if stored in a dry place keeps well. Barley will grow even in the Arctic Circle, and oats in quite a cold climate. Rye requires more warmth, wheat yet more, and maize more again, while rice is the corn of tropical countries.

In all kinds of corn the bulk consists chiefly of starch contained in a husk. It is easy to tell one kind of corn from another before grinding. The difference in the structure of the husk, and the size and shape of the starch particles, as seen under the microscope, serve to distinguish between the different kinds of corn when ground. Rice, as ordinarily sold, has been deprived of its husk.

Diseases of Corn.—The most common diseases of corn in this country are bunt, smut, and ergot. **Bunt** (called also *pepper brand*), frequently affecting wheat, grows within its seed, producing a fine powder. This powder, rubbed

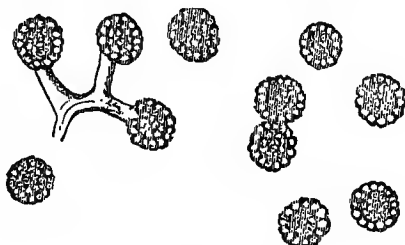


FIG. 83.—Spores of “bunt.”

between the fingers, feels greasy, and gives an unpleasant smell. Its appearance under the microscope (magnified 350 diameters) is shown in Fig. 83. **Smut** (called also *dust brand*), most frequently affecting barley, oats, and rye,

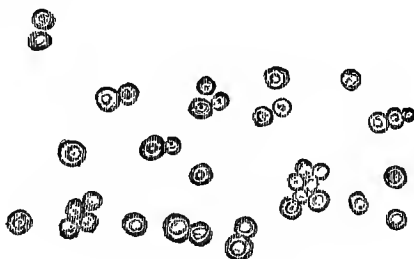


FIG. 84.—Spores of “smut.”

develops a powder like bunt, but finer, and has no smell. Its appearance under the microscope (magnified 350 diameters) is shown in Fig. 84. **Ergot**, for the most part confined to rye, develops early in the grain by taking

the place of the solid contents. It has a peculiar sour smell. The appearance of an ear of rye, when ergoted, is shown in Fig. 85.



FIG. 85.—Ear of ergoted rye.

All these diseases are due to a low form of plant growing in the grain, and if the powder produced be examined under a microscope, they may all be distinguished with certainty.

Little is known as to the effect of bunt or smut on those who may eat them, but eating ergot is distinctly injurious to health. However, no corn in which parasitic fungi have developed can be considered wholesome. Corn is also attacked by the *weevil* (an insect nearly as big as a grain) and by an *acar* (too small to be seen by the naked eye).

Flour.—The term “flour” may reasonably be held to include groats, barley meal and oat meal, ground rye, maize flour, and ground rice and rice flour. In other words, flour is coarse or fine ground corn.

Wheat-flour.—Ordinarily the term “flour,” used without qualification, means wheat-flour. The varieties of wheat naturally divide into two classes—white wheat and red wheat. Most of the wheat grown in this country is unbearded; a few varieties are bearded like barley. Among remarkable varieties is a one-sided wheat, the spike yielding but one row of corns, and the so-called Egyptian wheat, the stalk of which is branched and bears several ears.

In the process of threshing, wheat is deprived to some extent of its husks, but when it reaches the mill it is well sifted before grinding. The quality of the flour is to a

great extent dependent on the care exercised in grinding and dressing the wheat.

A quarter of wheat, weighing 504 lbs., is estimated to yield 333 lbs. of fine flour, 53 lbs. of "seconds," 34 lbs. of "middlings," 51 lbs. of fine and coarse pollard, 26 lbs. of bran, and 7 lbs. of waste.

Good flour should be of faint yellow colour, smooth to the touch, and not gritty or lumpy. If a handful be compressed it should adhere, taking the form given it. It should be slightly acid to test-paper (reddening litmus), but should not taste acid. When made into dough with water it should stick together well, drawing out easily into strings.

Flour may be made from diseased corn, in which case the presence of the spores of some fungus will probably be detected on examining it under the microscope. Flour may also be mouldy, a condition which is at once known by the characteristic smell. It may be exposed to damp, to make it weigh heavier, when it is more liable to mould. It may have undergone a kind of acid fermentation. This gives it a peculiar smell, an acid taste, and makes it somewhat gritty to the touch. Flour may be in a state of active decomposition, when it will be moist, discoloured, and of an offensive smell. Flour is also subject to two forms of adulteration—it may be mixed with a cheaper flour, with meal, or starch, or with some mineral substance to increase its weight or improve its colour. Wheat-flour is thus liable to be adulterated with the flour of barley, oats, maize, rice, and, less frequently, rye, or buckwheat, beans, peas, and linseed. Potato starch is also sometimes used for this purpose. Most of these adulterants can be certainly detected by examining the flour under the microscope. Some will appreciably alter the colour and taste of the

flour, and would thus afford sufficient indication to one who is not an expert.

The mineral substances used as adulterants of flour are alum, chalk, gypsum, powdered soapstone, silicate and carbonate of magnesia, and sulphate of barytes. All these, except alum, which is only added in very small quantity, can be readily detected by the simple process of burning the flour down to ash. The ash, which in wheat or maize flour should not exceed 2 per cent., and in barley, rye, or oats flour should not exceed 3 per cent., would be immensely increased. The best readily-applied test for the presence of *alum* is that known as the logwood test. It will give distinct indications, even though the proportion of alum in the flour be but a grain in the pound. The method of applying the test is thus given in Bell's well-known handbook :—

“The reagents required are recently-prepared tincture of logwood, and a solution of carbonate of ammonia. The former is prepared by digesting 5 grams of logwood chips in 100 cubic centimetres of strong alcohol; and the latter by dissolving 15 grams of carbonate of ammonia in 100 cubic centimetres of distilled water. The test is applied as follows:—A small quantity, say 5 grams, of flour is made into a paste, with 5 cubic centimetres of water; 1 cubic centimetre of logwood solution is then mixed with the paste, and this is followed immediately by the addition of 1 cubic centimetre of the solution of carbonate of ammonia. If alum be present, the colour produced will be more or less lavender or blue, according to the quantity of alum in the flour; but if the colour be pink, which soon fades to a dirty brown, then, according to our experience, alum is invariably absent. Should there be any doubt as to the colour, the paste is put aside for several hours, and then, if

alum be present, even in very small quantity, there will be a decided tinge of lavender on the sides of the capsule near the edge of the partly-dried paste."

Obtaining the lavender tinge is not absolutely conclusive proof of the presence of alum, or of any salt of alumina, but it is quite enough to cast some suspicion on the genuineness and wholesomeness of the flour. It is important to note that all wheat-flours contain some amount of alumina in the form of silicate, and perfectly pure samples have been found to contain a quantity of alumina equivalent to from 2 to upwards of 40 grains of ammonia alum in four pounds of flour.

Bread may be defined as the flour or meal of any corn, mixed with water, and dried or baked. The flour or meal may be freed from the husk, or may contain part, or the whole of it. The so-called "wholemeal bread" is made from the flour of wheat from which only the bran has been removed. The bread may be unleavened or it may be aërated with leaven or yeast, by kneading the flour with water charged with carbonic acid, or by means of a baking powder or a chemical compound. Thus, bread includes oat cakes, passover cakes, water biscuits, black or rye bread, etc. The word is, however, in this country usually restricted to wheaten bread leavened, fermented, or aërated.

Good wheaten bread should be well baked (not burnt), light and spongy, the crumb being well permeated with little cavities. It should be thoroughly kneaded, of good colour (white or brown), not acid to the taste, not bitter, not too moist. When set aside, the lower part should not become sodden. A 4-lb. loaf loses about $1\frac{1}{4}$ oz. in twenty-four hours, about 5 oz. in forty-eight hours, and about 7 oz. in sixty hours. This loss will vary with the temperature, draughts of air, etc.

Bread may have many defects. It may be sodden and heavy owing to bad flour or yeast, the sponge never having risen properly, or owing to imperfect baking. It may be sour owing to bad flour, or to fermentation having been allowed to proceed too far. A slight degree of sourness in leavened bread is not objected to. It may be bitter owing to bitter yeast. Finally, it may be mouldy, which is due to the bread having been too moist originally, having been kept in a damp place, or kept too long, or to bad flour having been used.

Wheaten bread may be adulterated with barley, maize, pea or bean flour, and with boiled rice or potatoes. For the purpose of improving the appearance of bread made from inferior, damaged, or mixed flour, a small quantity of alum is added. Its effect is to make the bread lighter and whiter. The quantity present is generally less than fifty grains to the 4-lb. loaf. The best rough test for alum in bread is the logwood test. The process, as applied to bread, is very simple. The tincture of logwood and solution of carbonate of ammonia, before referred to, are used. A teaspoonful of each is mixed with a wineglassful of water, and in this a piece of the crumb of bread is soaked for about five minutes. The bread is then removed and dried at a gentle heat. If no alum be present, the bread dries of a dirty brown colour; if a little be present, the bread dries of a lavender colour; if much alum be present, the bread dries of a dark blue colour.

CHAPTER XII

MILK

Importance of its being pure—Good milk—Unwholesome milk—Epizootic disease, anthrax, cattle-plague, pleuro-pneumonia, foot-and-mouth disease—Tuberculosis—Garget—Primarily good milk infected with animal disease germs—Primarily good milk infected with human disease germs, diphtheria, scarlatina, and typhoid fever—The Hendon cow disease—Dishonesty or uncleanness of milk-sellers—Sour milk—"Blue" and "red" milk—Tainted milk—Adulterated milk—Skimmed milk—Separated milk—Cream—Clotted cream—Preserved milk—Desiccated milk—Butter-milk—Koumiss—Kefyr—Galazyme—Preservatives in milk—The Public Health (Milk and Cream) Regulations, 1912.

MILK, though an animal food, occupies a position between this and vegetable food, and possesses to a considerable extent the nourishing properties of both. As it is largely used in a raw state, it is important it should not be infected with disease, and as it often forms the sole food of young children, it is important that it should be delivered without addition to it or abstraction from it. The milk ordinarily exposed for sale in this country is obtained from cows. There is also some sale for asses' and goats' milk, but it is inconsiderable. The same constituents are present in all, the proportions, however, differing appreciably.

Good milk is a yellowish-white, opaque liquid, having a specific gravity of from 1026 deg. to 1036 deg. It has a

fresh smell and a bland, sweet taste. After the milk is allowed to stand from four to eight hours the cream rises, and the remainder of the milk is less opaque, and nearly or quite white. The amount of milk a cow gives varies much. About twelve quarts is the average daily yield; just after calving it may be double this. Milk varies in quantity and composition with the breed of the cow, age of the cow, her health, the food given her, with the number of her pregnancies, with the time since calving, and probably, to a slight extent, with the season of the year. The first milk obtained after calving differs most noticeably from normal milk. It is a rich yellow colour, clots more readily, tastes like beaten eggs, and has a specific gravity of about 1050 deg. This milk is called "colostrum," popularly the "beestings." At a single milking there is also considerable difference between the "fore milk" and the "strippings," the latter being richer in cream. Goats' milk is, as a rule, rather richer than cows' milk; asses' milk is rather poorer. The peculiar smell of goats' milk always serves to distinguish it. The specific gravity of goats' milk is from 1032 deg. to 1036 deg., that of asses' milk from 1023 deg. to 1035 deg. In using lactometers it is important to remember that they are usually adjusted to 60 deg. Fah.; thus a correction should be made for temperature to the extent of nearly 1 deg. in specific gravity for every 10 deg. of temperature, above or below 60 deg. Fah. The whole of the cream never separates from milk, even if it be allowed to stand for twenty-four hours or longer; the amount by volume which separates varies from 2 to 25 per cent. of the milk. Usually it is from 6 to 12 per cent. Milk should contain not less than 3 per cent. of butter fat, and 8.5 per cent. of solids not fat. A well-known dairy company requires that milk supplied to them must con-

tain 3·25 per cent. of butter fat, and 8·75 per cent. of "solids not fat."

Unwholesome Milk.—Milk may be unwholesome from various causes, viz.:—(1) It may be derived from a cow suffering from a specific epizöotic disease. (2) It may be derived from a consumptive cow. (3) It may be drawn from an inflamed udder. (4) It may have become infected with the germs of an animal disease. (5) It may have become infected with the germs of a human disease. (6) It may have become sour. (7) It may have become "blue" or "red." (8) It may be tainted from things stored near it. (9) Injurious substances may have been added.

Epizöotic disease, fortunately, often arrests the secretion of milk, and in one disease especially liable to be injurious to man—**anthrax**—if there is any milk yielded, it is thick, and of bad colour, probably containing traces of blood, and readily decomposes. Still there is a case on record where this disease was communicated to a child who drank milk from an infected cow.

Cattle-plague seldom occurs in this country. The milk is, as a rule, so diminished in quantity, that it is difficult to obtain a sample. In appearance it differs from ordinary milk far more than colostrum. The sugar is scarcely a quarter of the normal amount, and the butter is very largely increased.

Pleuro-pneumonia does not appear to interfere appreciably with the milk secretion, and here, as well as in foreign countries, when the disease has prevailed, milk has been sold in the open market, and there is no way by which it may be recognised. Though there is no evidence of this disease being communicated to man, milk from a pleuro-pneumonic cow must be less than wholesome.

Foot-and-mouth disease nearly always exercises a marked influence on the milk supplied by the cow infected. The total yield of milk is diminished, it is richer in butter, and has a tendency to get stringy. It may contain traces of blood or pus, or small portions of sore-crusts. It soon sours, and sometimes has a faint cheesy odour. From the fact that sucking calves fed from infected animals get a very severe and fatal form of the disease, drinking the raw milk would appear to be one of the readiest ways of transmitting it. Children fed on such milk have developed an eruption in the mouth and throat and between the fingers, the eruption resembling that seen in infected animals. This milk should certainly be seized and destroyed when recognised.

Tuberculosis.—The question whether milk derived from a consumptive cow can be used for human food with impunity has been much debated. The unanimous opinion of those best qualified to judge is that such milk cannot be drunk without grave risk. It is proved that it can induce tuberculosis in many animals; and there are cases in which children have developed the disease after having been fed on milk from infected cows. There is, therefore, warrant for pronouncing tuberculous milk unfit for human food, and endeavouring to prevent its sale. As regards the quality of the milk, it is, probably, always somewhat deteriorated; but there is no means by which its being infected with the bacillus of tubercle can be ascertained, except by submitting a sample to an expert, that he may experiment with it on animals (guinea pigs). Searching for the bacillus by means of the microscope, and failing to find it, is no proof that the milk is not tuberculous. When the udder is infected with tuberculosis, the probability of finding the bacillus in the milk is enormously increased. However, milk from a

tuberculous udder may be held to be infective, and its sale or use for human food can be prevented.¹

Fig. 86 shows the hind-quarters of a cow whose udder

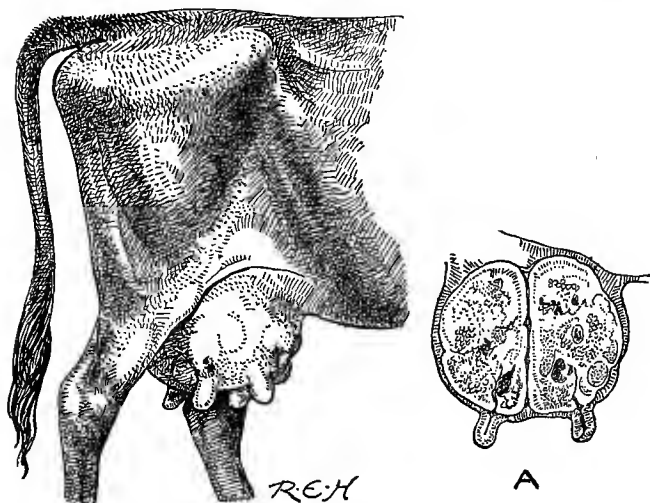


FIG. 86.—Tuberculosis of the udder of a cow.

is the subject of fairly advanced tubercular disease, and

¹ Article 15 of the Dairies, Cowsheds, and Milkshops Order of 1885 is as follows:—

Article XV. If at any time disease exists among the cattle in dairy or cowshed, or other building or place, the milk of a diseased cow therein—

- (a) shall not be mixed with other milk ; and
- (b) shall not be sold or used for human food ; and
- (c) shall not be sold or used for food of swine, or other animals, unless and until it has been boiled.

Article 2 of the Dairies, Cowsheds, and Milkshops Order of 1899 is as follows:—

Article II. Article 15 of the Order should be altered so that, for the purposes of the provisions of paragraphs (a) and (b) thereof, the expres-

at "A" the appearance of the same udder is shown in section.

As tuberculosis of the udder, and inflammation of the udder, are both ordinarily indicated by enlargement of the udder, want of symmetry and some amount of lumpiness, it is not always easy to differentiate between them. However, as the morbid condition advances, the diagnosis becomes simpler. The lumps are more marked and harder and the teats tend to swell. On section the udder is yellow in colour, and abscesses, new or old, are generally found. Where the organ has been some time diseased, nodules of tuberculous matter varying in size, and occasionally calcareous deposits, may be seen.

Consumers of milk who would avoid all risk should obtain their milk-supply from a herd tested with tuberculin and passed, or sterilise the milk, or simply raise the temperature of the milk to boiling point before using it.

Garget is a very common term among cattle salesmen and farmers. For instance, when a pig suffers from repletion, it is said to have garget of the maw; and in some parts of the country garget is used to signify a disease of the throat. Ordinarily the word means inflammation of the udder, and when milk is drawn from such an udder it is usually said to be gargety. Cows allowed to get into high condition, through being turned into a very rich pasturage, or otherwise, are predisposed to this. The most common causes of the malady are cold and exposure, over-distention of the udder from being long unmilked, bruising from unskilled

sions in the said article which refer to disease shall include, in the case of a cow, such disease of the udder as shall be certified by a veterinary surgeon to be tubercular; and the Order and the Amending Order shall apply and be construed with the modifications necessary to give effect to this Article.

milking, and pressure on the udder from an awkward way of lying. When from one or more of these causes inflammation of the udder is set up, great care is needed, or permanent injury may result. Taken in an early stage of the disease, the most important indication is to milk the udder quite empty twice a day ; but owing to the painfulness of the operation and the difficulty of getting the milk to flow, this can seldom be done. It is, however, always attempted, so that a cow with garget is regularly milked. Being ropy and often quite curdled, and not infrequently containing traces of pus and blood, it would not meet with a ready sale by itself ; but mixed with the rest of the produce of a dairy (perhaps twenty times its volume of sound milk) it may pass muster. It should be borne in mind that this kind of unwholesome milk is especially liable to be mixed with good milk.

Epizöotic disease, being for the most part readily communicated, may affect the whole stock of a farm at the same time ; similarly, ill-ventilated town cowsheds, in which animals are fed and stalled under the usually insanitary conditions, commonly have several inmates suffering from consumption at one and the same time ; but cases of inflamed udder occur singly, and have no tendency to spread beyond the case first affected. There is, therefore, usually plenty of good milk to mix with the tainted, and it is ordinarily mixed. Again, inflamed udders being due to causes always obtaining, milk is probably very frequently tainted from this cause. Indeed, the admixture of gargety milk with good milk may be done inadvertently, the fact that one cow in a large dairy has garget occasionally escapes notice till after two or three milkings. That gargety milk is unwholesome is beyond doubt. Besides being always changed in appearance, it will ordinarily contain some traces of blood

or pus or broken-down tissue. It is not likely that gargety milk is ever sold unmixed. Even mixed there is evidence of its producing indigestion and diarrhoea. Of course such milk when drunk has no power to produce any disease at all allied to garget.

Primarily good milk infected with animal disease germs.—Milk from healthy cows may become infected with the contagium of an animal disease in many ways. It will suffice to give three examples. In small dairies, where only a few cows are kept and the horse for the delivery cart is stabled in the cowhouse (not an uncommon arrangement), milk may become contaminated with the contagium of *glanders*, a disease which is undoubtedly communicable to man by means of the nasal discharges which are given off so abundantly by affected animals. In the second place, where the dairyman and his employees are not as scrupulously clean and careful as they ought to be, milk may be fouled by portions of the bowel discharge, and if the cow should chance to have some disease, the specific contagium of which is contained in this discharge, the milk would assuredly be specifically tainted. Again, healthy milk may be infected with the contagium of foot-and-mouth disease. The contagium liquid is in the vesicles on the udder and teats, and these vesicles get broken in milking, part of the contents being mixed with the affected animal's own milk. If the milker, without washing his hands, proceeds to milk an unaffected cow, the contagium will be mixed with her milk also.

Primarily good milk infected with human disease germs.—That good milk may become infected with the contagium of human disease is but too well known. Again and again outbreaks of diphtheria and scarlatina have occurred, the germs of the disease having been delivered in the morning's milk-can. Again and again have milk-pails,

rinsed out in polluted water, so contaminated the milk that customers drinking it have sickened with typhoid fever. The dairyman's family is suffering from an infectious disease, or one of his employees, or the farmer from whom he buys ; a few contagium particles get mixed with the milk, and the disease is soon spread over a wide district. How many other diseases besides the three named may be carried by milk is as yet uncertain. It is at least probable that measles may be sometimes thus conveyed.

It is stated on evidence not quite sufficient to amount to proof positive that a certain cow disease, which has been conveniently called the Hendon disease, so affects the milk of the infected animal that it is capable of producing scarlet-fever in those consuming it. If further investigation should support this view, one more will be added to the many dangers menacing those who drink raw milk.

The sum of the matter is that wherever disease is communicated by milk, it is, with few exceptions, owing to the dishonesty or uncleanness of milk-sellers, wholesale or retail. Inspection to be effective must be not only of the milk-shops and dairies, but of the cow-byres and farms. The food inspector will ordinarily be able to ascertain where there is epizöotic disease and where there is human infectious disease, while inflammation of the udder is easily recognised. Indeed, with the help of the medical officer of health, he should be able to prevent the sale of milk specifically infected, tuberculous milk alone excepted. The prevention of the sale of tuberculous milk has only quite lately been seriously attempted. Owing to the exercise of special powers given to many large urban districts, much more will be done in the near future to remove obviously tuberculous cows from milking herds, and to prevent the sale of milk found to be tuberculous.

There is an objectionable form of delivery which must occasionally result in milk becoming infected with the germs of human disease—the practice of milk-sellers leaving their own cans at houses and calling for them a little later. Such cans are commonly given back without being washed, and may be used again on the same round. This practice should be checked.

Sour Milk.—Under the influence of an organism (called the bacillus of lactic acid) introduced from without, the sugar of milk is converted into lactic acid, and it is this which causes milk to turn sour. Milk only slightly soured, exposed or offered for sale as “milk,” may be seized as unsound, and an application for an order to destroy it applied for. However, butter-milk is ordinarily sold somewhat “turned”; sour butter-milk may therefore be held to be the normal condition of butter-milk. When milk sours the part that forms the cheese, the casein, coagulates. In fresh milk the casein is combined with phosphate of lime, which keeps it fluid. The acid converts the neutral alkaline phosphate into an acid phosphate, and the casein coagulates. Warmth, as is well known, assists the change; thus milk in which only a very little lactic acid has been formed may appear perfectly fresh when cool, and yet curdle on boiling.

The curd produced by the action of rennet on milk is different from that produced when milk turns sour or where acid is added.

“Blue” or “Red” Milk.—Neither of these milks is common. In each a special organism has been discovered, and the development of the organism in the milk occasions the change of colour. The change is quite marked enough to attract the attention of the food inspector. “Blue” milk looks dirty, “red” a light pink, as if slightly stained with blood. Neither of them would sell readily. It may be

well to note here that the colour of milk is affected when the cow yielding the milk has been brouseing on certain plants. Thus the polygonum and some other plants would give the milk a blue tinge, while rhubarb and other plants would give the milk a red tinge. However, an expert would not mistake milk thus coloured for "blue" or "red" milk.

Tainted Milk.—Milk readily becomes tainted by noxious vapours, liquids, or solids. Thus coal-gas will taint it, paraffin, turpentine, urine, and the exhalations from contiguous middens. Tainted milk has the smell of the absorbed impurity, and is certainly unfit for human food. Milk may also be tainted by purgative or poisonous herbs, as meadow saffron and colchicum, which have been eaten by the cow. It is alleged that milk may be tainted when the cows yielding it have fed on sewage farms, or drunk from polluted ponds, but there is no reliable evidence in support of the theory.

Adulterated Milk.—Of the many adulterants added to milk, water is the most common, and this water may be dirty or (as already stated) infected with the germs of disease. The specific gravity, taken in conjunction with the amount of cream, will enable the inspector to judge if the milk has been watered to any considerable extent. Taking the specific gravity alone gives no useful information whatever, and, indeed, would probably lead the inspector to suspect an unusually rich sample of milk of being watered. The amount of cream varies so much that the inspector will not be able to detect the abstraction of cream. The method of analysis adopted by chemists consists in ascertaining the percentage of fats and non-fatty solids and the incombustible matter (ash) in a sample, and from the results obtained they form an opinion as to whether the milk is watered or skimmed, and the amount of water added or cream removed.

In individual cows, a good authority finds the fat vary from 1'92 to 6'87 per cent., and the non-fatty solids from 8'00 to 11'27 per cent. The other adulterants of milk, cane sugar, glycerine, carbonate of soda, salt, starch, borax, boracic acid, salicylic acid, etc., are many of them innocent. Some are added simply to make the milk keep, others to cover the addition of water. Annatto, or other colouring matter, is often added to make the milk look rich. Whether chalk is ever added may be doubted; as milk should have no sediment on standing, chalk would be easily detected. The presence of any of the adulterants named would be indicated if a sample of suspected milk were submitted to analysis.

Skimmed Milk is simply milk from which the cream has been removed by skimming after it has stood some hours. It is perfectly lawful to sell skimmed milk, provided it be sold as such. Milk with a specific gravity of 1026 deg. would ordinarily, after skimming, have a specific gravity of 1030 deg.

Separated Milk is milk from which the cream has been removed in a machine called a "cream separator." The milk is placed in a horizontal rotating vessel, driven at the rate of 6000 revolutions per minute, which sends the milk to the circumference, the cream coming to the centre of the upper part of the vessel. Arrangement is made for the gradual removal of both cream and separated milk. There is also a vertical rotating cream separator, which at a reduced rate of speed is said to be as effective. Almost the whole of the cream is separated from the milk, and in this respect separated milk differs from skimmed milk, in which only the cream which rises is removed.

Cream varies in composition according to the quality of the milk from which it is obtained and the method used in obtaining it. In skimming it from cold milk a varying

proportion of milk is removed along with it. The proportion of fat in cream ranges from 25 to 40 per cent.

Cream as ordinarily sold in bottles or jars is nearly always scalded, or mixed with a little boric acid, borax, or other chemical. Opinions vary greatly as to the amount of added chemical permissible.

Clotted Cream, sometimes called Devonshire cream, is solid, not fluid like ordinary cream. It should be made from new milk. The water is driven off by a slow process of heating, which occupies twelve hours. Other makers affirm that it is better not to begin the heating till the milk has stood ten or twelve hours. It keeps much better than the ordinary cream. The proportion of fat it contains is usually from 56 to 60 per cent.

Preserved Milk is now largely sold in air-tight tins. It is condensed by the simple process of removing water by evaporation. Two kinds are ordinarily sold, that sweetened by cane sugar, and the "unsweetened." The milk is reduced to about one-quarter of its original volume. The sugar added is stated to be from 1 lb. to $1\frac{1}{4}$ lb. for every quart of condensed milk. Sweetened condensed milk keeps well, but "unsweetened" does not remain good for any length of time after exposure to the air.

It has been stated that when milk, deprived of part of its cream, is condensed, the product looks better, and is more pleasant in flavour than when a rich milk is used. Even if this were so, it would afford no valid excuse for abstracting cream from milk before condensing it. "Condensed milk" must be taken to mean whole milk, deprived of a proportion of its water, and water only. If, therefore, this milk is reduced to about a quarter of its original volume, the minimum of butter fat should be about four times the minimum which would be required in ordinary milk.

Some brands of condensed milk recently analysed have been found to contain only from $1\frac{1}{2}$ to $2\frac{3}{4}$ per cent. of butter fat. These were obviously samples of condensed skimmed milk.

Unsweetened condensed milk, imported from abroad, is occasionally mixed with four times its weight of water and sold as pure new milk. The boiled flavour of such a mixture would ordinarily serve to distinguish it from new milk.

Desiccated Milk.—There is a good way of preserving milk, which has been made use of to a considerable extent in this country during recent years. It consists in drying the milk over smooth metal plates which are kept moving. As soon as the milk is quite dry it is scraped off automatically, and falls into a receiving basket as a thin light film. This is afterwards broken up into a coarse powder by means of a revolving beater turned by hand. The manufactured article looks nice and keeps well. It is easily packed and can be sent long distances. In this way the proprietors of a large dairy, after providing the necessary machine, can promptly preserve any excess of supply coming in. Desiccated milk is said to be largely used by manufacturers of milk chocolate, bon-bons, etc. In this manner separated milk may be preserved as readily as whole milk.

Butter-milk is the milk left after the manufacture of butter. It is thicker than new milk, slightly sour, and the casein, though coagulated, is in a finely-divided state. The proportion of fat is usually less than 1 per cent.

Koumiss is an alcoholic drink made by the fermentation of milk. It is prepared in Asia from mares' milk and camels' milk, and in this country from cows' milk. Koumiss is made by the Tartars as follows:—One part of sour milk is mixed with ten parts of warm fresh milk, and a small

quantity of sugar, and stirred from time to time. In three or four hours part of the sugar of the fresh milk is changed into lactic acid and part undergoes alcoholic fermentation—that is, is changed into carbonic acid, alcohol, and water. There is, doubtless, also some change in the casein, making it more digestible. Koumiss contains from 1 to nearly 3 per cent. of alcohol, and a little over or a little under 1 per cent. of fat. The name **kefyr** is given to fermented cows' milk made in the Caucasus. The koumiss manufactured from cows' milk in England is of three qualities, the one being neutral, one slightly acid, and one very acid. Even after bottling it is not constant in quality, the acid fermentation, and to some extent the alcoholic fermentation, continuing. A drink somewhat similar to koumiss is **galazyme**. A solution of sugar and a special ferment are added to a bottle of milk, which is then corked and tied down. The result is an effervescing beverage containing about 1 per cent. of alcohol.

Preservatives in Milk.—On July 11th, 1906, the Local Government Board issued a circular letter on this subject, addressed to authorities under the Sale of Food and Drugs Acts. The Board request attention to the addition of preservatives to milk. A serious objection to the use of preservatives in milk has, they say, been pointed out in the report of the Departmental Committee on Preservatives and Colouring Matters in Food, who state that preservatives in milk “may be relied on to protect those engaged” in the milk traffic “against the immediate results of neglect of scrupulous cleanliness. Under the influence of these preservatives, milk may be exposed without sensible injury to conditions which otherwise would render it unsaleable. It may remain sweet to taste and smell and yet have incorporated disease germs of various

kinds, whereof the activity may be suspended for a time by the action of the preservative, but may be resumed before the milk is digested."

This Committee, after hearing evidence from milk traders, concluded that the addition of a preservative to milk is not necessary for the purposes of the milk trade, even in hot weather, or where the supply of so large a place as London is concerned, and the Committee recommended that no preservatives should be added to milk.

In making this recommendation the Committee had special regard to evidence received as to two classes of preservative substances which, under various names, are frequently used as preservatives in milk, viz. (1) formalin (a 40 per cent. solution of formic aldehyde) and other preparations of formic aldehyde; and (2) boron preservatives (boric acid, borax, or mixtures of boric acid and borax). The Committee considered that the addition to milk of formalin or preparations of formalin, even when the amount which could be detected was minute, was objectionable, on account of the alterations effected by formalin in the character of certain of the constituents of milk, and of its ability to interfere directly with digestive processes.

Although in the view of the Committee boron preservatives might reasonably be employed in the case of certain foods, within defined limits and subject to a declaration as to their presence and amount, the Committee recommended their exclusion from milk altogether; partly for the reasons above indicated, and partly also in consideration of the immense importance of pure milk for the nutrition of infants, invalids, and convalescents, and of the comparatively large quantity of milk which may be taken, particularly by children, in comparison with the other foods in question. Moreover, the Committee had evidence

“pointing to an injurious effect of boracised milk upon the health of very young children.”

Since the report of the Committee was made, the Board have from time to time had before them further evidence on the subject, and this supports the conclusions of the Committee not only as to the objections to the use of preservatives on the ground of public health, but also as to the ability of milk traders to conduct their business without use of preservatives. Thus in certain boroughs in London and elsewhere in which milk samples are systematically tested for preservatives, the presence of preservatives in milk, at any time of the year, has been found to be exceptional; and there is evidence to show that a very large number of milk vendors conduct their business without the use of these substances, even where the milk comes long distances by rail.

In some districts action under the Sale of Food and Drugs Acts has been frequently and successfully taken in order to bring about the disuse of preservatives in milk. Proceedings instituted against vendors of milk containing preservatives have usually been taken under Section 6 of the Sale of Food and Drugs Act, 1875. Conviction has followed, it being held that when the purchaser who asks for milk is supplied with milk plus a preservative he does not receive an article of the nature, substance, and quality demanded, and is prejudiced thereby.

The Board are of opinion that action under the Sale of Food and Drugs Acts in regard to preservatives in milk is desirable, and that this subject deserves attention from all authorities in England and Wales charged with the execution of these Acts.

In this connection the following suggestions are made for adoption by the Council where a similar procedure is not already followed:—

1. *Information from Public Analysts*

The Board suggest that public analysts should be requested

- (a) to record in their quarterly reports how many milk samples have been examined during the quarter with a view to ascertaining the presence of substances commonly in use as preservatives, and with what result; and to draw the attention of the Council to instances where the use of preservatives in milk other than boron preservatives and formalin have come under notice;
- (b) to report, on completion of analysis, the facts as to samples of milk which have been found to contain any added preservative.

2. *Administrative Action where Preservatives in Milk are reported*

The Board would suggest that the Council should notify to milk traders, by circular or otherwise, that action will be taken under the Sale of Food and Drugs Acts in instances where preservatives are reported in milk.

Subject to this being done, and to exceptional cases of the kind referred to under the heading numbered 3 below, the Board consider that when the presence of any added preservative is reported in a sample of milk taken in accordance with the provisions of the Sale of Food and Drugs Acts, the case should in ordinary circumstances be regarded as one for the institution of proceedings under those Acts.

3. *Declaration and Notices*

The Board think it desirable to draw attention to cases in which the vendor of the milk, with the object of escaping

liability under Section 6 of the Sale of Food and Drugs Act, 1875, declares to the purchaser by means of a notice, label, or otherwise, that he does not sell "milk" as such, or that its quality in regard to preservatives or other constituents is not guaranteed, or that it contains some added preservative.

The Board would suggest the desirability of frequent sampling in cases where "milk" is sold subject to declarations of the kind, with a view to ascertaining the condition of such milk in regard to preservatives.

The nature of the declaration made should in all cases be carefully recorded by the officer taking the sample, and should also be reported to the analyst when the sample is transmitted for analysis.

Where preservatives are reported in milk thus sold, the question will arise whether, in view of the nature and quantity of the preservatives added, it can be considered that the article has been rendered injurious to health, or that the purchaser has been prejudiced, to an extent which would justify the institution of proceedings under Section 3 or Section 6 of the Sale of Food and Drugs Act, 1875, notwithstanding the declaration made at the time of purchase.

This question is not without difficulty, in view of the general objection to the employment of any preservatives in milk referred to above.

As regards formalin and boron preservatives, however, the Board are advised that the presence in milk of formalin to an amount which is ascertained by examination *within three days of collecting the sample* to exceed 1 part in 40,000 (1 part in 100,000 of formic aldehyde) raises a strong presumption that the article has been rendered injurious to health, and that the purchaser has been prejudiced, in the

above sense; and also that similar presumption is raised where boron preservatives are present in milk to an amount exceeding 40 grains of boric acid per gallon.

It appears desirable that the addition of preservatives to skim milk, separated milk, and condensed milk, should be watched and controlled on similar lines.

The above circular letter is so interesting that it is thought well to insert it here, though Councils and their officers will now be guided by the Order and circular of August 1912.

The Public Health (Milk and Cream) Regulations, 1912.

Dated August 1st, 1912.

A circular dated August 6th, 1912, was sent by the Local Government Board to Councils of Counties and Boroughs, in which the Board's Secretary adverts to the Public Health (Regulations as to Food) Act, 1907 (7 Edw. c. 32), under which the Board are empowered to make regulations authorising measures to be taken for the prevention of danger arising to public health from the importation, preparation, storage, and distribution of articles of food or drink (otherwise than drugs or water) intended for sale for human consumption. In connection with the powers thus conferred, the Secretary continues, the Board have had under consideration and inquiry the danger to health which may be entailed by the addition of preservatives and other foreign substances to milk and cream, and the importance of controlling such additions, and they have now made Regulations under that Act, entitled "The Public Health (Milk and Cream) Regulations, 1912." Copies of the Order containing these Regulations were sent out with the circular.

In making these Regulations, due regard has been had to

representations which the Board have received from Local Authorities under the Sale of Food and Drugs Acts, from representatives of the trades affected, and from others concerned.

The Regulations are designed to secure that no preservative shall be added to milk, or to cream containing less than 35 per cent. by weight of milk fat, at any stage from the place of production to that of delivery to the purchaser. In the case of cream containing over 35 per cent. of milk fat, the addition of boric acid, borax, or a mixture of these preservative substances, or of hydrogen peroxide, is not prohibited by the Regulations, but is subject to a system of declaration which is required to be followed by all persons dealing with such cream for the purpose of sale for human consumption. By this system (Part II. of the Regulations) it is intended that preserved cream, as an article of commerce, shall in all stages be differentiated from cream to which no preservative has been added. Further, Article IV. (a) prohibits the addition of any thickening substance to cream or preserved cream.

It will be seen that, except as regards Part III., the duty of administering the Regulations has been placed upon those authorities in England and Wales who are Local Authorities for administering the Sale of Food and Drugs Acts.

Existing arrangements for the collection and examination of milk samples under the Sale of Food and Drugs Acts can readily be extended so as to enable the Council to receive such reports from the Public Analyst as are requisite. Arrangements will be required for the periodical examination of samples of cream for the purpose of ascertaining whether the requirements of the Order are being duly complied with.

In the case of any contravention of the Regulations,

steps should be taken to ascertain the circumstances in which the default has arisen. Article VI. requires that before the Local Authority institute proceedings against any person for contravention of any of the Regulations in Part II. of the Order, the Local Authority shall afford him an opportunity of furnishing an explanation, and shall consider such explanation and all the circumstances of the case. It should be observed that the proceedings here in question are those authorised by the Public Health (Regulations as to Food) Act, 1907, and the enactments referred to in the notice at the foot of the Order.

It will be desirable that the Medical Officer of Health should be instructed to exercise general supervision over the action taken in pursuance of these Regulations, and that the officer of the Council who directs sampling under the Sale of Food and Drugs Acts should be instructed to confer with the Medical Officer of Health, and with the Public Analyst, as to the details of proceedings necessary to secure the observance of the Regulations in the area over which the Council has supervision.

The Regulations will, as regards their main provisions, take effect on and after October 1st next, and as regards Article V. (1) on January 1st, 1913. The Board are anxious to secure uniformity in the administration of the Regulations, and will be glad to have their attention drawn to any cases of difficulty which may hereafter arise.

Copies of the Regulations and this circular are to be transmitted to the Medical Officer of Health and Public Analyst.

The Regulations and this circular are printed, and may be obtained from any bookseller at one penny each.

The Order is divided into four Parts, and in all contains twelve Articles.

In Part I. are two Articles.

Article I. sets forth the interpretation to be put on words and phrases in these Regulations, unless the contrary intention appears.

Article II. states that, subject as provided in subdivision (1) of Article V., these Regulations shall come into operation on October 1st, 1912.

Part II. contains Articles III. to VII. The first of these prohibits preservatives in milk, and the next restricts the use of preservatives in cream. Article V. requires declaration of preservatives in cream. Article VI. sets forth the powers and duties of the Local Authority, and Article VII. gives directions as to samples. The exact wording of these Articles is as follows:—

Article III.—(1) No person shall add, or order or permit any other person to add, any preservative substance to milk intended for sale for human consumption.

(2) No person shall sell, or expose or offer for sale, or have in his possession for the purpose of sale, any milk to which any preservative substance has been added in contravention of the provisions of subdivision (1) of this Article.

Article IV.—(1) No person shall add, or order or permit any other person to add—

- (a) any thickening substance to cream or preserved cream ;
- (b) any preservative substance to cream containing less than 35 per cent. by weight of milk fat ;
- (c) to cream containing 35 per cent. or more by weight of milk fat any preservative substance other than—
 - (i) boric acid, borax, or a mixture of those preservative substances ; or
 - (ii) hydrogen peroxide ;

in any case in which the cream is intended for sale for human consumption.

(2) No person shall sell, or expose or offer for sale, or have in his possession for the purpose of sale, any cream to which any thickening substance or any preservative substance has been added in contravention of the provisions of subdivision (1) of this Article.

Article V.—(1) Every seller of preserved cream shall, in every advertisement, price list, or trade list which is used in connection with the sale of preserved cream for human consumption, describe that article as preserved cream, and in no such document shall any words be contained which might imply that the preserved cream is cream to which a preservative substance has not been added.

The provision in this subdivision of this Article shall come into operation on the First day of January, One thousand nine hundred and thirteen.

(2) No seller of preserved cream shall deposit for sale in any place, or despatch or deliver to any purchaser, or to any other person, any receptacle containing preserved cream intended for human consumption unless the receptacle is labelled in the manner prescribed in the Schedule to these Regulations, and unless, in the case of preserved cream containing boric acid, borax, or a mixture of those preservative substances, the amount of those substances calculated as boric acid (H_3BO_3) is accurately stated as not exceeding the limit specified on the label in the manner prescribed in the said Schedule:

Provided that if in any public refreshment room, restaurant, shop, or other public premises, preserved cream is delivered to a purchaser or other person for consumption on the premises, the receptacle containing the preserved

cream shall not be required to be labelled in accordance with the foregoing provisions if there is placed in a conspicuous position in every room on the premises in which customers are served with refreshments a notice, printed in large and easily legible type, indicating that the cream supplied for consumption on the premises is preserved cream, or if a statement to that effect is conspicuously made on every bill of fare exhibited to customers, or if by some other adequate means similar intimation is publicly given.

Article VI.—The Local Authority shall enforce and execute the Regulations in this Part of this Order, and for this purpose shall authorise the making of inquiries and the taking of any other steps which may seem to them to be necessary for securing the due observance of the Regulations in their district :

Provided that before the Local Authority institute proceedings against any person for a contravention of any of the Regulations in this Part of this Order, the Local Authority shall afford him an opportunity of furnishing an explanation in writing or otherwise as they may appoint, and shall duly consider any such explanation and all the circumstances of the case.

Article VII.—Any of the officers named in Section 13 of the Sale of Food and Drugs Act, 1875, may under the direction of the Local Authority appointing him procure for examination, in accordance with the provisions of Section 14 of that Act (as amended by subsequent legislation), so far as the same may be applicable, samples of milk or cream or preserved cream, or of any article resembling milk or cream, or of any substance which appears to be intended for addition to milk or cream ; and the owner or occupier of any premises on which there is deposited milk or cream

or preserved cream intended for sale, or for preparation for sale, for human consumption, or the person having the custody thereof, shall afford to the officer or to any officer of the Local Government Board all reasonable facilities for entering the said premises for the purpose of taking samples or making inquiries, or for any other purpose of the Regulations in this Part of this Order.

Part III. includes Article VIII., giving restrictions on importation, and Article IX., stating the powers and duties under the Order of Officers of Customs and Excise. The words are as follows:—

Article VIII.—No person shall import into England or Wales—

- (a) any foreign milk to which any preservative substance has been added ;
- (b) any foreign cream to which any thickening substance has been added ;
- (c) any foreign cream containing less than 35 per cent. by weight of milk fat to which any preservative substance has been added ;
- (d) any foreign cream containing 35 per cent. or more by weight of milk fat to which has been added any preservative substance other than—
 - (i) boric acid, borax, or a mixture of those preservative substances ; or
 - (ii) hydrogen peroxide ;
- (e) any foreign preserved cream which is not contained in a vessel or receptacle duly labelled in the manner prescribed in the Schedule to these Regulations.

Article IX.—(1) The Officers of Customs and Excise shall enforce and execute the Regulations in this Part of this Order, and for this purpose shall, in accordance with

directions given by the Treasury after consultation with Us, take samples of consignments of imported milk or cream or articles resembling milk or cream.

(2) When any Officer of Customs and Excise takes a sample in pursuance of subdivision (1) of this Article he shall divide it into not less than three parts, and send one part to the importer, and one part to the Principal Chemist of the Government Laboratories, and retain one part for future comparison.

(3) In any proceeding under this Part of this Order the certificate of the Principal Chemist of the Government Laboratories of the result of the analysis shall be sufficient evidence of the facts therein stated, unless the defendant requires that the person who made the analysis be called as a witness, and the defendant shall not be entitled to require the person who made the analysis to be called as a witness unless he shall, at least three clear days before the return day, give notice to the prosecutor that he requires his attendance, and deposit with the prosecutor a sum sufficient to cover the reasonable costs and expenses of his attendance, which costs and expenses shall be paid by the defendant in the event of his conviction.

(4) If in any case the Officer of Customs and Excise is of opinion that an offence has been committed under this Part of this Order he shall communicate to Us for Our information the name of the importer and such other information as he possesses or may obtain as to the destination of the consignment.

Part VI. contains Article X., showing how differences in relation to analysing may be determined; Article XI., directing that powers given by these Regulations are to be cumulative; and Article XII., giving the short title of the Regulations.

The exact wording of these Articles is as follows :—

Article X.—(1) If a difference arises in relation to any subject matter of, or to anything done under, these Regulations, the difference may, on the application of all the parties affected, be referred to Us for determination.

(2) It shall be at Our option to determine any such difference as arbitrators or otherwise; and, if We elect to determine the difference as arbitrators, the provisions of the Regulation of Railways Act, 1868, respecting arbitrations by the Board of Trade, and the enactments amending those provisions, shall apply as if they were re-enacted in these Regulations, and in terms made applicable to Us, and to the determination of the difference.

(3) Where We elect to determine any such difference otherwise than as arbitrators, We may by Our Order determine the difference, and Our determination shall be final and conclusive.

(4) Every Order made up by Us in pursuance of this Article shall have effect as if the Order were enacted in these Regulations.

Article XI.—All powers given by these Regulations shall be deemed to be in addition to, and not in derogation of, any other powers conferred by Regulations under the Public Health (Regulations as to Food) Act, 1907; and those other powers may be exercised in the same manner as if these Regulations had not been made.

Article XII.—These Regulations may be cited as “The Public Health (Milk and Cream) Regulations, 1912.”

The appended Schedule is a part of the Order.

*Regulations with Respect to the Labelling of
Preserved Cream.*

1. Every receptacle containing preserved cream shall be labelled by the attachment thereto of an adhesive label, in this Schedule referred to as the "declaratory label."

2. Every declaratory label shall be in the form and contain the information indicated in Label I. or Label II. set out in this Schedule, as the case may require. Such information shall be printed in black type, of not less size than that shown in the said Label I. or Label II., upon a white ground in the centre of the declaratory label, and nothing else shall be printed on the declaratory label, except that in every case in which Label I. is used the maximum amount per cent. of boric acid (H_3BO_3) contained in the preserved cream shall be stated in figures on the declaratory label.

LABEL I.

**PRESERVED CREAM
CONTAINING
BORIC ACID
NOT EXCEEDING
PER CENT.**

LABEL II.

**PRESERVED CREAM
(PEROXIDE).**

3. The size of the declaratory label shall be determined as follows :—

Capacity of Receptacle.	Size of Label.
Not exceeding 1 pint . . .	Ins. $\frac{3}{4}$ by Ins. $1\frac{3}{4}$
Exceeding 1 pint . . .	3 by 5

4. The declaratory label shall be so attached to the receptacle that the whole of the label shall be visible and clearly legible, and the declaratory label shall not be overlapped by any other label or otherwise obscured.

5. The declaratory label shall not be affixed either over the mouth of the receptacle or beneath the receptacle.

6. Where on any receptacle containing preserved cream, or on any wrapper or package in which such receptacle is enclosed, there appears any reference by label (other than the declaratory label) or otherwise to preserved cream contained therein, the preserved cream shall in every case be described as "preserved cream," the words "preserved" and "cream" being set out in letters of the same size.

7. No receptacle containing preserved cream shall bear or shall have attached on any label a trade description within the meaning of the Merchandise Marks Act, 1887, which shall be false or in any way likely to mislead a purchaser as to the presence or utility of the preservative substance or as to the declaratory label or as to the Regulations.

At the foot of the Order is the following :—

NOTICE.—The Public Health Act, 1896, provides by subsection (3) of Section 1 that if any person wilfully neglects or refuses to obey or carry out, or obstructs the execution of, any regulation made under any of the enactments mentioned in that Act, he shall be liable to a penalty not exceeding one hundred pounds, and, in the case of a continuing offence, to a further penalty not exceeding fifty pounds for every day during which the offence continues.

The power of making regulations under the Public Health Act, 1896, and the enactments mentioned in that Act, is enlarged by the Public Health (Regulations as to Food) Act, 1907.

CHAPTER XIII

ARROWROOT AND SIMILAR PREPARATIONS. — BUTTER AND ITS SUBSTITUTES—CHEESE, LARD, AND EGGS

Purified starches — Arrowroot — Sago — Pearl sago — Tapioca, tapioca flour — Corn-flour — Farina — Tous les mois — Semolina — Revalenta-arabica — Macaroni and vermicelli — Butter — Whey butter — Rancid butter — Adulterated butter — Margarine — Le Dansk — Cheese — Annatto — Adulterated cheese — Cheesine — Skim cheese — Soft cheeses — Parasites — Damaged cheese — Lard — Adulterated lard — How to tell fresh eggs — Preserved eggs.

IN this and the following chapters it is proposed to treat of foods not mentioned in the Public Health Act. This chapter will deal with arrowroot, sago, tapioca, corn-flour, farina, etc., as well as butter, margarine, cheese, lard, and eggs, leaving for the two next chapters, tea, coffee, cocoa, chocolate, sugar, honey, treacle, mustard, pepper, Cayenne pepper, spices, salad oil, vinegar, and certain foods sold cooked.

Though, as has been already stated, the term "flour" may be held to include the flour or meal of any corn (wheat, barley, oats, rye, maize, and rice), it does not include preparations of purified starches, the best known of which are arrowroot, sago, tapioca, and so-called "corn-

flour." It is well to remember that all these, being nearly pure starches, are incomplete foods by themselves, and cannot take the place of flour. Combined with flesh-forming and bone-forming material, prepared starches are excellent food. Chemically all the starches are alike, but under the microscope each description of starch is readily distinguished by the form, size, and marking of the granules. The envelope of the granules being tough, starch is indigestible in a raw state. To make starch digestible, it must be heated sufficiently to rupture the granules. The descriptions of starch having large granules rupture at a comparatively low temperature (113 deg. Fah.); the descriptions of starch with small granules require to be heated to nearly 194 deg. Fah. to ensure rupture. The proportion in which one starch is mixed with another is estimated by means of the microscope.

Each kind of starch has its own peculiar flavour.

Arrowroot is derived from the rhizomes (underground stems) of a plant which is a native of the West Indian Islands, India, and the tropical parts of America. Several species of this plant, *Maranta*, are cultivated for the manufacture of arrowroot. The plant is from 4 ft. to 6 ft. high, with broad, pointed leaves, and the rhizomes are long and pointed and as thick as a finger.

The preparation of arrowroot is as follows:—The rhizomes when mature are dug up, washed, peeled, and reduced to pulp. The fibrous matter is then separated from the starch by washing the pulp in a sieve. The starch which passes through the sieve with the water is again repeatedly washed till pure, when it is dried. The rhizome yields at most about 25 per cent. of starch. The value of arrowroot depends largely on its purity, and this is generally fairly indicated by its brilliancy and whiteness.

Arrowroot consists simply of starch, about 16 per cent. of water, and a trace of mineral matter. The form of the starch granules as seen in Bermuda arrowroot is shown in Fig. 87.

Arrowroot is adulterated with cheaper purified starches,



FIG. 87.—Bermuda arrowroot starch.

or these may be even substituted for it, and sold under the name of arrowroot. It is not possible to distinguish arrowroot from any pure starch by simple inspection or chemical analysis, but this is done with certainty by means of the microscope. Even a small admixture of another starch can

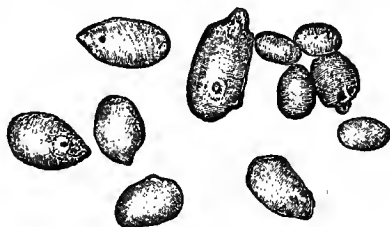


FIG. 88.—Curcuma starch.

be detected. Curcuma starch, a preparation manufactured in the East Indies from the tuberous roots of curcuma plants, and called sometimes East India arrowroot, bears some resemblance to Bermuda arrowroot, and a close resemblance to Natal arrowroot. The form of the granules, shown in Fig. 88, very closely resembles arrowroot.

Sago is manufactured from the pith of the stems of several species of palm. The sago-palm grows in the islands of the Indian Ocean and in the south-east of Asia. It attains a height of 20 ft. to 30 ft., and measures 5 ft. or 6 ft. round the trunk. The tree is cut down at maturity, and the trunk cut into lengths of 6 ft. or more, and split lengthwise. The pith is then scooped out, and powdered and washed with water till the starch has been separated from the fibre. A sieve or similar apparatus is used as in preparing arrow-root. After repeated washings the starch is dried. The

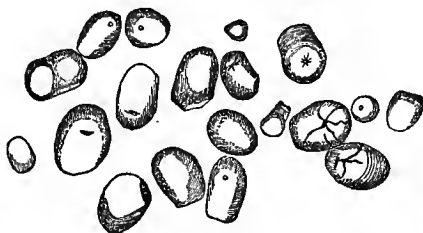


FIG. 89.—Sago starch.

form of the starch granules is shown in Fig. 89. The produce of the trunk of a single tree may exceed 500 lbs. of sago, and, after the trunk is cut down, a new trunk grows from the root.

Pearl Sago, large and small, is prepared from sago-flour by mixing it with water into a paste and granulating it with a sieve. Pearl sago is dried in shallow pans over a slow fire, a large proportion of the starch granules being ruptured and much of the starch gelatinised. Pearl sago consists of starch, about 15 per cent. of water, and a trace of mineral matter.

Sago is rarely adulterated, but sago-flour, which is largely used in making household starch, may be adulterated with potato starch, or the latter may be substituted for it.

Tapioca is derived from the tuberous roots of several species of the cassava plant, cultivated in Africa and tropical America. The plants grow to a height of 5 ft. or 6 ft., and are propagated by cuttings. The tuberous roots are about 14 in. long, and from 4 in. to 5 in. thick. The tubers, which occur in clusters, are washed and peeled and reduced to pulp. The pulp is pressed, and the juice therefrom allowed to settle. The deposit is repeatedly washed and then sun-dried, and the outcome is *tapioca flour*. The appearance of this flour, which is simply cassava starch, is shown in Fig. 90. The remainder of the pulped tubers

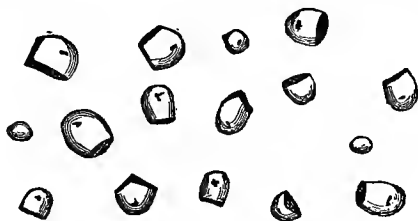


FIG. 90.—Tapioca (cassava) starch.

(what is left after the expulsion of the juice) is used for making cassava meal and bread. Tapioca, as known to commerce, is made by heating the deposit from the cassava juice when moist on hot plates, and stirring it. A large portion of the starch granules rupture, and much of the starch is gelatinised. Tapioca, therefore, except in derivation and external appearance, closely resembles pearl sago. Tapioca consists of starch, about 15 per cent. of water, and a very minute trace of mineral matter.

Tapioca is rarely adulterated, but it might be with a cheaper prepared starch.

Corn-flour is not the flour of maize or rice, but a preparation therefrom. Much of the flesh-forming and bone-forming

parts of the flour are extracted by soda or lime. About 2 per cent. of flesh-forming and bone-forming matter is left. There is rather less water than in arrowroot, pearl sago, and

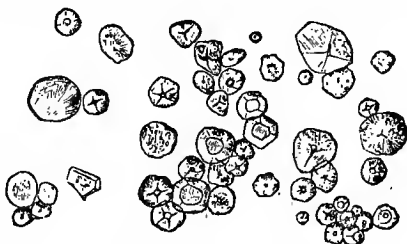


FIG. 91.—Maize starch.

tapioca, and more mineral matter. The appearance of maize starch under the microscope is shown in Fig. 91.

In rice starch the granules are much smaller than in any other commercial starch, so that no other starch could be mistaken for it.



FIG. 92.—Potato starch.

Farina literally means simply flour, but the article ordinarily sold under this name is a purified starch made from potatoes. The potatoes are washed and peeled and reduced to a pulp, and the fibrous matter separated from the starch by washing, as in the preparation of arrowroot. The appearance of potato-starch granules is shown in Fig. 92.

Farina, being cheaper than other starches, is not adulterated.

Tous les Mois is the French name given to another purified starch, made from the rhizome of the *Canna edulis*, a plant grown in the West Indies. The appearance of the starch granules under the microscope is very characteristic. It is shown in Fig. 93. *Tous les Mois* is prepared like arrowroot.

The illustrations of starches here given are all drawn to



FIG. 93.—Tous les Mois starch.

the same scale, and represent the appearance of the granules magnified 350 diameters.

There are many preparations of farinaceous food which do not come within the description "purified starches." Thus there are (1) certain granular preparations of wheat, etc., such as *semolina*, made from the inside of the grain of wheat; (2) certain proprietary foods, of which *Revalenta-arabica* will serve as an example, largely composed of the highly nutritious flour of lentils; and (3) *macaroni* and *vermicelli*, made from hard Italian wheat, with or without the addition of eggs. The meal or flour used in the manufacture of macaroni and vermicelli is derived from the

inside of the grain (*semoule*), which must be of good quality, soft or tender wheat being useless for the purpose. In macaroni made with eggs, the proportion is four or five to the pound of flour. These being worked up together, the paste is damped with hot water, and kneaded and rolled out into very thin sheets, which are left till dry on the surface, and then rolled up tightly and cut. Water macaroni and vermicelli are manufactured from dough of *semoule* and hot water. The dough is rolled out and cut into ribbons, or forced through moulds, which give it its familiar forms.

Butter consists of the fatty portion of milk—chiefly cows' milk. It is suspended in the milk-liquid in the form of minute fat globules. When milk is left at rest some time most of the fat globules (being lighter than the rest of the milk) rise to the top, forming a layer of cream. The cream, which contains casein and milk-liquid as well as fat, is ordinarily removed by skimming, and violently shaken or beaten up in a churn or other suitable vessel, till the fat globules unite and form a mass. This mass, carefully washed and squeezed, with or without the addition of salt, is the butter of commerce.

Butter varies much in colour, flavour, and quality. The colour ranges, according to the season and the food and breed of the cow, from deep yellow to almost white. The flavour is influenced by the food of the cow and the quality by the state of the cream, the method of churning and making up the butter, etc.

Carefully prepared butter has a pleasant odour and agreeable taste, and is of the same consistency and colour throughout. It is easily cut and moulded into shapes, and melts to a light-coloured oil. It always contains water and curd and a trace of mineral matter, and nearly always a

minute portion of sugar of milk. The curd is especially liable to decompose, and the change in the curd is soon followed by decomposition of the fat; hence the addition of salt as a preservative. Butter fat, freed from curd and water, and fairly excluded from the air, will keep a long time without change.

It seems superfluous to say that butter of fine flavour cannot be made from sour cream. Yet much butter is made from sour cream, particularly in small farms and dairies. The best method of collecting cream for churning and securing its sweetness is by setting the milk to cream in iced coolers. Where there is a large quantity of milk to be dealt with, it is convenient to use the cream separator, an apparatus already described. The temperature of the milk at the time of churning should be raised to from 55 deg. to 65 deg. Fah. In some places the entire milk is churned instead of the cream only, this practice prevailing where there is a ready market for butter-milk.

The amount of fat in butter ranges from about 80 to 90 per cent. The amount of water generally ranges from 7 or 8 to 16 per cent., and any amount exceeding this is injurious to the keeping qualities of the butter. More than 16 per cent. of water is forbidden under the Sale of Butter Regulations, 1902. The amount of curd should not exceed 1 or 2 per cent.; when the butter is badly made there may be as much as 5 per cent. present. The amount of salt in butter varies much, from less than 1 per cent. to 15 per cent. There is no clear distinction between salt and fresh butter, so much depends on custom. A degree of saltiness which would be allowed in fresh butter in one country might constitute salt butter in another.

Whey Butter.—Butter made from cream (or new milk) is often called cream butter to distinguish it from butter

made from whey. When in cheese-making the whey is drained from the curd, it brings with it more or less butter, which is worth recovering. The whey is collected in a large tank, and left to cool, and the butter is then easily gathered from the surface. It is then washed and salted and made up. If the washing is very carefully and thoroughly done, very good butter may be made from whey. Its value is ordinarily about two-thirds of the value of good cream butter. Whey butter is, like cheese, not infrequently coloured with annatto.

Rancid Butter.—The fat of butter consists of many fatty acids in union with glycerine. On the decomposition of the fat, butyric and other acids are liberated, and the butter is said to be rancid. At first it has a cheesy, and afterwards, as the rancidness increases, an acrid taste.

Adulterated Butter.—There is no doubt that occasionally the practice is resorted to of working up a quantity of water with butter (in addition to the water incorporated in the process of manufacture) for the purpose of increasing the weight. Butter thus treated must be regarded as adulterated. There is an instance on record in which upwards of 42 per cent. of water was found in a sample of butter. An undue proportion of salt may also be regarded as an adulteration. Sometimes this appears to be added to enable the butter to take up more water. An instance is on record in which upwards of 28 per cent. of salt was found in a sample of butter. The amount of water allowable in butter should not exceed 16 per cent., and the amount of salt should not exceed 8 per cent. It is stated that butter is adulterated with flour or mineral matter, but such frauds must be very uncommon and could be easily detected. Ordinarily adulterated butter is butter mixed with other animal fats or vegetable fats ; or such fats coloured and salted and churned

up with a little milk to give them the appearance and flavour of butter. Such admixture or substitution can be readily and certainly detected owing to the difference in the specific gravity of butter fat and foreign fat, and the difference in their melting points. Chemists are also guided by the difference in the proportion of soluble and insoluble acids yielded by butter fat and foreign fat.

Margarine was, up to the time of the passing of the Margarine Act, called butterine. It cannot, of course, adequately take the place of butter, but is a wholesome low-priced substitute. It should be made from perfectly fresh ox fat, the fat ordinarily being derived from the omentum (the "kells") and the mesentery. These are hung up to cool, soaked in warm and cold water to cleanse them, and then minced in an apparatus resembling a sausage machine. The minced fat is then put in a pan heated to a temperature of 120 deg. Fah. by a steam coil or otherwise. After melting, the clear fat is drawn off and cooled slowly at a temperature of 70 deg. Fah. Then the granulated fat is divided into parcels, wrapped in canvas, and subjected to hydraulic pressure. The connective tissue, if any, and stearine remain in the canvas; nearly all the oleomargarine (about 50 per cent.) is pressed out. The latter is churned up, at a temperature of about 70 deg. Fah., with milk, colouring matter (annatto), and sometimes a little carbonate of soda. The product is suddenly cooled and then churned again. Finally, about 5 per cent. of salt is mixed in, and the butterine (now called margarine) is ready for the market. This process is varied more or less in different factories, and in some a certain proportion of olive oil or nut oil is mixed with the sweet fat. Among the oils used in this way are cocoanut oil, palm kernel oil, sesame oil, cotton-seed oil, sunflower oil, maize oil, arachis oil, and even poppy oil

Other vegetable oils have also been used in the manufacture of butter substitutes. Some of these are said to have proved poisonous, and others are fairly strong purgatives.

Margarine resembles butter in appearance, and keeps well.

In Chapter III., dealing with "Statutory Powers," the Butter and Margarine Act, 1907, is referred to at great length. It may be well, however, to note here that, under that Act, the limit of water in margarine and in milk-blended butter is especially stated. Butter and margarine are not allowed to contain more than 16 per cent. of water, and milk-blended butter is not allowed to contain more than 24 per cent. of water.

Under section 8, wrappers enclosing "margarine" are not required to be marked "margarine" exclusively, as previously ordered, but may be marked with a fancy or other descriptive name (approved by the Board of Agriculture and Fisheries) and printed in type not larger than, and in the same colour as the word "margarine."

Under section 9, milk-blended butter may be dealt with under such name or names (approved by the Board of Agriculture and Fisheries) as the makers select, without the additional word "margarine," provided that on the wrapper containing the article when delivered to the customer, such description of the article be printed as the Board require, setting out the percentage of moisture contained therein.

Clause 10 states definitely that the Board are not to approve of any name for margarine or milk-blended butter which refers to or is suggestive of butter.

Under section 13 a new definition of "margarine" is given, viz. :—"Any article of food, whether mixed with butter or not, which resembles butter and is not milk-blended butter."

Le Dansk is the name given to a butter substitute introduced into this country from France. Clean fat is cut

up and melted at a temperature of about 120 deg. Fah., and cooled slowly, and the oleomargarine separated from the stearine, etc., by hydraulic pressure. The product is then churned up with new milk and oil and pure butter, cooled in ice water, salted and packed.

Cheese is made from whole milk, or skimmed milk, or milk enriched with cream. Its colour, flavour, and quality vary according to the breed and food of the animals giving the milk, the richness of the milk, and the mode of manufacture and age of ripeness of the cheese. The process of cheese-making may be described as follows:—The milk is first heated till it reaches a temperature of about 80 deg. Fah., and converted into curds and whey by means of rennet. When annatto or other colouring matter is used it is usually stirred in with the rennet. The coagulation should be completed in an hour, and then the curd may be cut up or gently broken down and stirred and left to settle. As it is needful that the curd should develop a little acidity, this is effected in various ways. Thus the curds and whey are heated to a temperature of 98 deg. Fah., and allowed to stand, or a little soured whey is added with the rennet, or the souring of the curd is not encouraged till the whey is drained off, or removed with a syphon. Sweet curd, gathered in a heap, covered with a cloth, and allowed to stand for an hour or so becomes slightly acid. Again, the curd may be put into the press-vats quite sweet, and the necessary acidity will be produced in a few hours. In cheese factories the breaking up of the curd is effected in curd-mills. If the curd is rich in fat, only a little salt is needed to prevent excessive fermentation in the cheese; if the curd is poor more salt is needed. Excess of fat spoils a cheese, preventing its ripening. The curd is pressed in cloths in the press-vat for two or three days, during which time the cheese

is turned from time to time, and the wet cloths changed for dry ones. From the press the cheese is taken to the curing-room (which is kept at a uniform temperature) to mellow and acquire flavour. The ripening is due to slow fermentative changes. When it is complete the constituents of the cheese are similar to those of milk, but the following changes have taken place in them: the butter has been drained off with the whey, and the milk sugar has changed, a part into lactic acid, and a part into alcoholic or carbonic acid. There is also present some common salt, and usually a little colouring matter.

Cheese may be made on what is termed the early ripening principle, so that it may be quickly brought into the market; but such cheese will not keep long without deteriorating, so that it must be sold within a very limited time. However, makers who have abundance of good storage are able, if they desire, to make long-keeping cheese, an article that will keep twelve or eighteen months, and be improved by keeping.

The best-known cheeses produced in this country are probably Cheshire cheese, Cheddar cheese, double Gloucester cheese, and Stilton cheese. The first three are made from whole milk, Stilton from a mixture of whole milk and cream. American cheese, largely consumed in this country, is ordinarily made from whole milk, and more uniform in quality than English cheese.

Annatto is so much used for colouring cheese, and so regularly sold in cheese-making districts, that a few words with reference to it may be of service. It is sold in roll and cake, and dissolved in water or spirit. It is a colouring matter derived from the seeds of an evergreen, the *Bixa orellana*, prepared in Brazil, Cayenne, and elsewhere. The colour is on the outside of the seeds, which are in pods.

The seeds, with or without bruising, are steeped in water, and usually subjected to some amount of fermentation. The extracted colour is then strained from the rest of the seeds, precipitated, and dried. Preparations containing more or less turmeric are sometimes sold.

Solid annatto is said to be adulterated with flour or chalk, or with sulphate of lime, and as this reduces the colour-intensity, salt and alkali are added. In the aqueous solution the presence of a little alkali as a solvent is not considered an adulterant. At one time annatto was much adulterated with Venetian red or other ferruginous earth.

Adulterated Cheese.—Annatto, or some other vegetable colouring matter, is the only foreign ingredient ordinarily found in English cheese, and, as long as this is not injurious, it need not be considered as an adulteration. It is reported that starches have been occasionally worked up with the curd, which would constitute an adulteration, but the practice cannot be common, and is easy of detection. Pastes and washes containing arsenic, lead, or other poisonous metals, are sometimes applied to the surface of cheeses to preserve them from the attacks of insects. This may be termed injurious adulteration of the rind, and is easily tested for.

However, for some years past an inferior American cheese has been imported in which the natural milk fat has been replaced by ordinary animal fat. The fats used appear to be either lard or oleomargarine, and the cheeses thus made are known to the trade as cheesine. Probably a sort of artificial milk is first made by shaking up foreign fat with warmed skim milk, and then cheese is made as it would be from new milk. Such an article, sold simply as cheese, must be regarded as adulterated, and the adulteration can be detected by analysis. Cheese made in this way may be of

good flavour, and is doubtless quite wholesome. There is no objection to it if sold at a low price for what it is. Even the term "cheesine" is not definite enough. Cheese made with lard should be called **lard cheese**, and that made with oleomargarine should be called **margarine cheese**.

Good English or American cheese ordinarily contains from 30 to 40 per cent. of water, from 25 to 35 per cent. of fat, from 25 to 35 casein, under 1 per cent. free acid, and under 2 per cent. of salt. A cheese containing less than 25 per cent. of fat is probably not a whole-milk cheese, and a cheese containing less than 10 per cent. of fat should be classed as **skim cheese**. A very rich cheese, such as Stilton, ordinarily contains less than 30 per cent. of water and more than 35 per cent. of fat; and a very dry cheese, such as Parmesan, will contain less than 30 per cent. of water, much less than 20 per cent. of fat, and more than 40 per cent. of casein. Dutch cheese is also below the standard per cent. as regards fat, and has 4 or 5 per cent. of salt.

Soft Cheeses.—In the manufacture of soft cheeses the rennet is ordinarily added to the milk at a low temperature, the development of acidity in the curd is not encouraged, and the cheese is subjected to very little pressure. The cheeses best known in this country are English cream cheese, which varies much in quality, but usually contains very little (say 5 per cent.) casein and upwards of 50 per cent. of fat, and Neufchatel cheese, containing 15 to 20 per cent. of casein and about 40 per cent. of fat. There is a favourite soft cheese imported from France (Roquefort), which is made from ewes' milk. It contains less fat and much more casein than English or Neufchatel cream cheeses.

Parasites.—The blue mould, so much esteemed, and also the red mould, are vegetable fungoid growths, and specially affect the finer and richer kinds of cheese. The

maggots often found in new cheese are the larvæ of the piophilæ fly. The cheese-mite (*acarus*) attacks, for the most part, old and dried cheeses. Ordinarily, cheese is not considered unsound owing to the presence of parasites, but cheese may be so badly infected with multitudes of maggots or mites as to justify seizure.

Damaged Cheese.—Cheese may be so damaged, from sea-water for instance, as to warrant its being seized; or through being kept in an unsuitable place, or otherwise, the butter fat in it may become rancid.

Lard is the fat of swine, rendered at a temperature of 120 deg. Fah., and freed from connective tissue. The fat is cut up and melted in a vessel heated by steam coil, or otherwise, the clear liquid is run into bladders, kegs, or tierces. Lard should be white and free from smell. It should also be free from all but the merest trace of water, having not more than one part in 300. Its specific gravity usually ranges from 903·5 to 905 at 100 deg. Fah. Sometimes a small portion of salt is added during melting.

Adulterated Lard.—Flour or starch, it is said, is sometimes added to the lard, but this would only rarely be done, as the sophistication would be noticed by most housewives. There is no doubt water is often worked up with lard, even in considerable quantity, but this, too, is easily detected. Lately it has been found that cotton-seed oil, or other cheap favourite oils, are used for the adulteration of lard. Experts are able to prove the adulteration, and estimate the quantity of foreign oils present.

Eggs, like milk, form a complete food, but only if the shells be included. As eaten, they are a highly nutritious food in a very digestible form. The eggs of the domestic fowl are the most plentiful, but those of the duck, goose, turkey, guinea fowl, and plover are also used.

Eggs of all birds have the same composition, but their flavour depends on the bird laying them and its food. The white of the egg consists of albumen and water, and a very small amount of fats and salts. The yolk consists of water, albuminous matter, and fats, and a very small amount of colouring matter and salts. The egg albumen coagulates at 158 deg. Fah.

The egg of the domestic fowl weighs from 600 to upwards of 950 grains. The average weight is 750 grains, of which 105 grains are shell, 405 white, and 240 yolk. The white contains about 85 per cent. of water, the yolk about 51 per cent. An egg weighing two ounces is estimated to contain nearly 200 grains of solid.

The food inspector may often be called upon to judge of the freshness or otherwise of eggs exposed for sale. Dealers commonly test them by holding them up one after the other before a candle—fresh eggs are most transparent in the centre, old ones at the top. Another way of testing eggs is by putting them in salt water (two ounces of salt dissolved in a pint of water). Good eggs sink in salt water, indifferent ones swim. Really bad eggs float in fresh water, but these may sometimes be known by the smell even when the shell is whole.

Eggs may be preserved for many months by various devices which prevent the entrance of air through their porous shells. Thus they may be covered with salt, which soon gathers moisture, or coated with gum, or buttered and wrapped in paper, or painted over with a solution of bees'-wax in warm oil, or placed in lime water containing a little cream of tartar. For a comparatively short time eggs may be kept by boiling them for half a minute. Eggs may be removed from their shells and dried, but they keep better if previously mixed with a little flour or ground rice.

CHAPTER XIV

TEA, COFFEE, COCOA, AND SUGARS

Tea—Compressed tea—Adulterated tea—Coffee—Adulterated coffee—Chicory—Cocoa—Adulterated cocoa—Chocolate—Sugars—Cane sugar—Beetroot sugar—Maple sugar—Jaggery—Treacle—Glucose—The sugar-mite—Sweet-meats—Honey.

TEA is the dried leaf of the Chinese plant *Thea sinensis*, the Assam plant *Thea Assamica*, etc. It is an evergreen, and in cultivation not allowed to attain to its full growth, but kept as a dwarf tree at from three to six feet. Only the young leaves are used, those from two inches long and under, but usually there are present portions of young branches and flower buds. The leaves are gathered several times a year; the tea prepared from the first, or early spring gathering, is the best. The finest teas, other things being equal, are produced from young plants. The difference in the many varieties of teas imported depends not alone upon the age of the plant and leaves, the differences of soil, climate, and cultivation, etc., but largely also upon the process followed in manufacture. Whatever the mode of preparation adopted, it proceeds on these general lines:—The leaves after gathering are artificially warmed, or thrown into a heap to develop heat, or beaten with the hand till they are sufficiently soft to roll, and then

(with or without previous exposure to the air for some hours) dried over a charcoal fire. Except in rapidly-made teas, a certain amount of fermentation takes place before rolling and drying. After the drying is complete, the tea is sorted and sifted and hand-picked. Ill-dried leaves are thus removed, and the whole gathering is divided into many parcels each containing leaves of nearly the same size.

The difference between green tea and black is that the former is rapidly made from choice young leaves, more carefully rolled, and not subjected to fermentative change. Some of the best-known varieties of green teas are Hyson, Young Hyson, Gunpowder, and Imperial; some of the best-known varieties of black teas are Congou, Moning, Oolong, Souchong, Indian Souchong, and Assam. Some teas are scented to impart an agreeable flavour, as scented Pekoe, the leaves of which are placed in contact with the flowers of the *Olea fragrans*.

Tea is not a food, but a stimulant. Its most important constituent, which is easily isolated and identified by chemists, is a crystalline substance—*theine*. Besides this, there is in tea a very small quantity of an essential oil (to which much of the smell of tea is due), albumen, tannin, woody fibre, resin, gum, etc., water and incombustible matter or ash. The proportion of theine in tea ranges from about $1\frac{1}{2}$ to $3\frac{1}{2}$ per cent.; the proportion of albumen, or vegetable casein, is about 17 per cent.; the proportion of tannin is from 10 to 27 per cent.; the proportion of woody fibre is from 20 to 35 per cent.; the proportion of resin, gum, etc., is 7 or 8 per cent.; the proportion of water is from 5 to 12 per cent.; and the proportion of ash from $3\frac{1}{2}$ to 8 per cent.

Tea of good quality should have delicacy and fulness of

flavour and a certain amount of body. Its value depends upon this, rather than on the amount of theine it contains.

Compressed Tea.—Tea compressed into hard tablets differs in no respect from ordinary tea, except that the finer teas are not prepared in this way, and that sometimes a little starch water or similar preparation is used to assist the tea to bind. The brick-tea of Thibet differs from this; little care is bestowed on the cultivation of the tree, and the leaf is coarse. The leaves are exposed to the sun till flaccid, hand-rolled, and put aside to ferment, then pressed into wooden moulds and dried with charcoal fires.

Adulterated Tea.—When tea was high-priced, probably few articles were so generally adulterated. Now tea is seldom adulterated, and probably only before shipment. The adulterations which have been practised are as follows:—

(1) Leaves from which an infusion has been obtained, and which are partially exhausted, have been re-dried and added.

(2) Leaves from other plants, such as the sloe, willow, and elder, have been prepared and added.

(3) Black teas have been coloured, or “faced,” with Dutch pink or plumbago. Green teas have been faced with Prussian blue or indigo, French chalk or sulphate of lime.

(4) Sand, magnetic oxide (iron filings), and gum or rice water have been added.

Tea adulterated with partially exhausted leaves might be tested by making an extract from a given quantity of the suspected tea, evaporating it down to dryness, and seeing if it was markedly below the amount of extract yielded by tea of the description indicated. A considerable admixture of exhausted tea would be thus detected, but not a small admixture.

The adulteration of tea with the leaves of other plants

is easily detected by making an infusion in the usual way and unrolling many of the leaves.

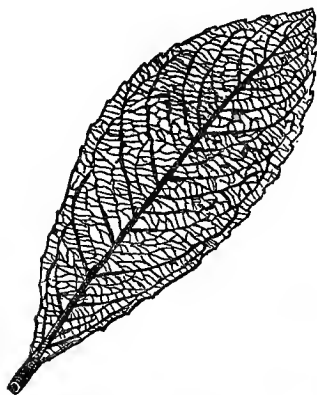


FIG. 94.—Leaf of tea.



FIG. 95.—Leaf of sloe.

The appearance of the genuine tea-leaf is given in Fig. 94,



FIG. 96.—Leaf of willow.



FIG. 97.—Leaf of elder.

that of the sloe-leaf in Fig. 95, the leaf of the willow in Fig. 96, and the leaf of the elder in Fig. 97.

Artificial colour, or facing, of tea may be washed off by shaking up the tea in cold water. The substances used may then be seen under the microscope, or their presence proved by chemical tests.

The presence of sand and the amount of it can be demonstrated by reducing a weighed quantity of tea to ash. For demonstrating the presence of magnetic oxide the tea may be powdered and stirred with a magnet. Starch may be washed off the tea with cold water and tested for in the usual way.

Coffee is the seed of an evergreen plant, the *Coffea Arabica*. In cultivation it is not allowed to attain to a height of more than about six feet, a third of its natural height. The fruit of the plant is a dark scarlet berry, the size of a small cherry. Each berry usually contains two beans enveloped in (1) an inner skin, (2) a tough envelope known as the parchment, and (3) an outer husk. The natives sun-dry the berries, and remove the outsides by passing them between rollers; but the European planter, dealing with large quantities, uses a "pulper," a kind of mill into which the fresh berries are thrown, with a stream of water—the husk is thus removed as pulp, and the beans left in parchment. Small portions of the inner skin of the husk are often attached to the bean. The coffee tree begins to produce when three or four years old. The beans are sorted according to size by machinery, and then roasted at a temperature of 320 deg. Fah. A small proportion is retailed raw. Mocha coffee is considered the finest. The coffees of Java and Ceylon have also a good reputation for quality. Coffee is largely grown in Jamaica, India, and Brazil.

Coffee, like tea, is not a food, but a stimulant. The most important constituent of coffee, raw or roasted, is a crystalline substance, **caffeine**. Besides this, there is, in

coffee, fat, legumen or albumen, caffeotannic acid, woody fibre, sugar, gum, water, and incombustible matter, or ash. As a result of roasting caffeone is produced, an oil which gives the coffee aroma, and the woody fibre is much changed and rendered more brittle. The proportion of caffeine in coffee is about 1 per cent. (roasting somewhat reducing the quantity); the proportion of fat is 12 or 13 per cent.; the proportion of legumen or albumen is 10 to 13 per cent.; the proportion of caffeotannic acid is from 3 to 5 per cent. (about twice as much in raw coffee); the proportion of woody fibre is from 34 to 50 per cent. The proportion of sugar is about 9 per cent. in raw coffee, nearly all of which is changed by roasting into caramel (burnt sugar), which gives to coffee infusion its rich brown colour. The proportion of gum is less than 1 per cent. in raw coffee, about $1\frac{1}{3}$ per cent. in roasted coffee. The proportion of water is about 9 per cent. in raw coffee, and about 1 per cent. in roasted coffee. The incombustible matter, or ash, ordinarily amounts to nearly 4 per cent. in raw coffee, and nearly 5 per cent. in roasted coffee.

The value of coffee and its aroma and flavour depend upon the country or district from which it comes, more than upon the amount of any of its constituents.

Adulterated Coffee.—As coffee beans vary much in size, weight, and quality, it is possible, by careful sorting, out of one crop to obtain varieties so different in appearance that they may be sold as Mocha, Java, and Ceylon. Though a green colour is ordinarily evidence of immaturity, small beans of Brazil coffee, according to a recent report, are dyed green, and sold as a choice product of Arabia. Adulterated ground coffee has also been compressed by machinery into the shape of coffee beans.

Coffee, as ordinarily sold—that is roasted, and ground—

may be adulterated with chicory, dandelion root, mangolds, carrots, parsnips, and turnips, peas, beans, acorns, date stones, locust beans, and pods, corn, and figs. These roots, seeds, etc., after roasting and grinding, sufficiently resemble coffee in general appearance to permit of their being added to it in varying quantities, without attracting attention. There is not one of them, however, which resembles coffee under the microscope, or has the same chemical composition ; thus coffee adulteration may always be detected by microscopical examination and chemical analysis.

One coffee adulterant, chicory, is so much more used than all others that it may almost be regarded as the sole adulterant of coffee in this country. Roast chicory has little in common with roast coffee, except burnt sugar, and it has a large proportion of this. The strong taste of burnt sugar, and the increased depth of colour it gives to the infusion, apparently leads many consumers to prefer coffee and chicory to pure coffee. Indeed, a beverage resembling in flavour and colour that made from a mixture of coffee and chicory may be made from a mixture of coffee and burnt sugar.

The presence of chicory in coffee is easily detected by microscopic examination, by the specific gravity and depth of colour of an infusion, by the examination of the ash, etc. There is also a direct chemical test.

There are several ready ways by which the food inspector may come to an opinion as to whether a sample is adulterated and should be submitted to an expert for examination. Thus, if coffee cakes when pressed between the fingers, or in the paper in which it is folded, it is probably adulterated. When grains of coffee, spread on a piece of glass, are moistened with a few drops of water, the coffee should

remain hard ; any particles softening indicates adulteration. Thirdly, there is the colour test. When a few grains of coffee containing chicory are let fall on the surface of cold water in a glass, a yellowish-brown colour is given off by each particle of chicory, which soon spreads through the water. This is due to chicory in cold water having four times the colouring power of coffee. The difference in taste between coffee and chicory is also some guide to the food inspector.

Chicory, otherwise known as succory, grows wild in this country. In many parts its bright blue blossoms are very abundant in August and September. The stem is from one to three feet high, higher when cultivated. The root grows deep into the ground, is white and fleshy, and yields a milky juice. Foreign chicory is considered superior to that of English growth. It is pulled before the plant blossoms, and the root is carefully dried. When roasted 2 lbs. of lard or butter is added to each cwt. of dried root. Usually it is ground before being sold. It has some outward resemblance to ground coffee, but lacks its characteristic aroma. Roast chicory differs from roast coffee chiefly in containing a much larger proportion of burnt sugar, a much smaller proportion of fatty matter, and no caffeine or caffeotannic acid. In chicory the ash is for the most part insoluble, in this respect also differing from coffee. Chicory also absorbs moisture freely, which coffee does not.

Chicory may be adulterated with dandelion root, mangolds, carrots, parsnips, and turnips. The quantity of sugar in these is nearly as great as in chicory. Chicory may be distinguished from these roots, and other possible adulterants, by means of the microscope. All substances employed to adulterate coffee may be used to adulterate

chicory. Indeed, when adulterants other than chicory are found in coffee, it is commonly due to their having been first used to adulterate the chicory added.

Rust of iron, or other mineral red, may occasionally be added to give colour. It is easily detected by analysis.

It is stated that in the preparation of inferior chicory rancid fat is used.

Cocoa is prepared from the seed of the plant *Theobroma cacao*. It is extensively cultivated in the West Indies, Brazil, and Guiana, and usually attains a height of from 12 ft. to 20 ft.

The tree begins to bear when three years old, and the fruit is chiefly gathered in June and December. The fruit is from 5 in. to 12 in. long and 3 in. thick, or smaller. The rind is fleshy, and within the seeds are arranged in five rows embedded in pulp. After removal from the fruit, the seeds are left in pits or heaps for four or five days to ferment, and are then dried in the sun, or otherwise. They are next roasted over a charcoal fire, in the process losing about 10 per cent. in weight. The seeds are broken in a machine, and finally the husks are separated from the cocoa nibs by winnowing. Only a small portion of the cocoa imported is sold as nibs; the bulk is reduced to paste. A cheap form of cocoa is prepared from the whole roasted seed, which is ground and made into a coarse paste, and, when dry, sold as "flake cocoa." What is called "rock cocoa" is prepared from the nibs ground to a paste with sugar, with or without the addition of some starchy substance. So-called "soluble cocoas" are various kinds of rock cocoa reduced to powder. The starchy substance added to prepared cocoa absorbs the fat of the cocoa, and the whole is easily miscible with boiling water.

There is a preparation of cocoa known as "cocoa

essence" or otherwise, in which a portion of the cocoa fat is removed by hot-pressing the nibs. Cocoa thus treated agrees better with invalids and others.

In cocoa nibs are nearly all the substances constituting a perfect food. About half of the raw nibs is cocoa fat or butter. There is about 13 per cent. of albuminous matter, and 4 or 5 per cent. of starch. The proportion of moisture and woody fibre is relatively very low. Its most important constituent is theobromine, a crystalline substance resembling theine. This is a volatile principle which gives cocoa its characteristic odour, but which is not an essential oil, and an astringent principle, of the nature of tannin, part of which is changed into a colouring matter during roasting, besides a very small quantity of gum-like matter. The ash, or incombustible matter, in the nibs, ranges from about 3 to 6 per cent.

Working up sugar and prepared starches with ground cocoa nibs cannot fairly be termed an adulteration of cocoa. The product is sold as prepared or soluble cocoa, or by some fancy name, and neither the trade nor the public are induced to believe that the manufactured article is pure ground nibs.

Prepared or soluble cocoas contain from 23 to 28 per cent. of non-fatty cocoa, from 17 to 25 per cent. of fat, and about the same proportion of added starch, from 23 to 33 per cent. of sugar, and about 5 per cent. of moisture.

Adulterated Cocoa.—It is said that cocoa nibs are sometimes adulterated with portions of roast chicory root. This could be detected, even after grinding, by a microscopic examination, and by the high colour of a cold-water extract. The addition of chalk or sulphate of lime, with or in place of starch, has been reported, and also the addition of mineral red colouring matter. The presence and amount

of such adulterants would be at once indicated on analysis. Ordinarily the only substances added to manufactured cocoa are sugar and prepared starches, and so long as these are not in great excess, or the mixture is not sold as pure cocoa, manufactured cocoa is not considered an adulterated article.

Chocolate is ordinarily manufactured from ground cocoa nibs, a large quantity of sugar, and a little sago-flour or arrowroot, or other prepared starch. It is flavoured with vanilla, cinnamon, or other aromatic substance. The proportions vary much. Thus the sugar may be absent or may amount to 60 per cent; the starch may be absent or may amount to 30 per cent, or may be replaced by wheat, flour, etc. In many preparations a portion of the cocoa fat is removed.

The addition of red earth or colouring matter is rightly regarded as an adulteration, and can be detected on analysis.

Sugars have been divided into the fermentable and non-fermentable sugars. To the latter class belong many sweet principles found in plants, but with these the food inspector has nothing to do. The ordinary commercial sugars are all fermentable—that is to say, cane sugar, beetroot and maple sugar, jaggery, molasses, and glucose.

Cane Sugar is derived from many varieties of sugar cane cultivated in tropical or sub-tropical climates. The cane matures in from twelve to sixteen months, and after being cut down fresh stems spring up. The plantation is renewed every five or six years. The cane, stripped of leaves and top joints, is crushed between rollers to express the juice, which is then heated. A little sulphate of lime, or similar substance, is added to neutralise any acid present, and prevent fermentation, and the impurities which rise to the top are skimmed off. The juice thus evaporated down

and crystallised is known as "raw sugar." Much of this is refined in this country. The refiner dissolves it in a small quantity of water, and usually heats it with bullocks' blood and filters it. The syrup is again heated and run through animal charcoal, and passed on to a vacuum pan to be

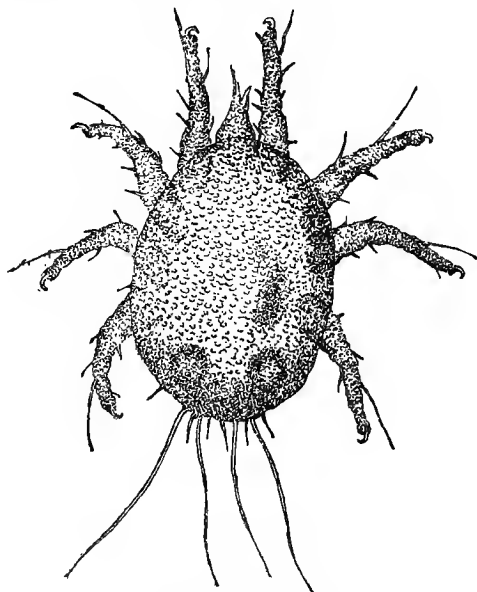


FIG. 98.—The sugar insect.

concentrated, after which it is allowed to crystallise. If loaf sugar is required, the air is admitted when the liquor has got just beyond the crystallising point, and the temperature is raised. The hot liquid and crystals are then thrown rapidly into moulds, and left to drain and harden. After two days a saturated solution of pure white sugar is passed

through the moulds to remove any impure syrup. The sugar is then turned out of the moulds and slowly dried in a stove.

The sugar-mite (*acarus*) is sometimes found in raw sugar. Like the cheese-mite, it is plainly visible without the use of a magnifying glass. In samples of sugar containing these insects they and their eggs are present in great numbers. The sugar-mite was first detected by Dr Hassall in 1851. Fig. 98 is copied from his drawing of the insect.

Sporules of fungus are also found in raw sugar, and small portions of woody fibre and grit.

Beetroot Sugar is prepared from the fresh roots washed and trimmed. They are reduced to pulp, from which the juice is pressed ; or sliced, and treated with warm water. The expressed juice or juice and water is heated with milk of lime to a temperature of about 140 deg. Fah. and the scum removed. Carbonic acid is then forced in to free the liquid from all trace of lime. The liquid is next passed through animal charcoal into a vacuum pan, and evaporated to a thick syrup, about half of which is pure sugar. The loaf sugar is made as already described.

From time to time the question is asked, how loaf sugar made from beetroot may be distinguished from loaf sugar made from sugar cane. If these sugars are quite pure (as they ordinarily are) there is no method by which either the analytical chemist or the microscopist may distinguish one from the other.

Maple Sugar is prepared from the sugar-maple, a tree abundant in parts of America. The tree is tapped in the spring, and the sap drawn is freed from gross impurities, boiled down, run into small moulds, and dried.

Jaggery.—This name is given to a coarse kind of raw sugar obtained by boiling down the sap of various palm

trees, such as the cocoanut and the wild date-palm. It is ordinarily the cheapest sugar imported.

Treacle or Molasses.—This is the name given to the liquor left after the crystallisation of raw sugar. The liquor left after the crystallisation of raw sugar is ordinarily called "golden syrup." These liquors vary in composition, but always contain a large quantity of uncrystallisable sugar derived from cane sugar, the change being aided by the heat employed. Since the introduction of the vacuum pan, sugar liquor is boiled at a lower temperature than previously, more sugar crystallises, and less treacle is produced. The product corresponding to treacle resulting from the manufacture of beetroot sugar is of inferior quality, and not commonly sold for domestic use.

Glucose is altogether different from the other fermentable sugars. It exists ready formed in some fruits, and honey is largely composed of it. Its manufacture from grain and other substances containing starch is carried on extensively in this country. There are two or three processes of manufacture.

The following is an approved method. The grain or other substance is ground and mixed in a vat with about four times its weight of water and 2 to 4 per cent. of sulphuric acid. The mixture is heated to a temperature of 306 deg. Fah. for nearly half an hour, by which the starch is converted into sugar. Chalk is then added to remove the sulphuric acid, the syrup is filtered, and partially evaporated in a vacuum pan, and run through charcoal. It is then boiled down in a vacuum pan, the boiling taking place at a temperature not exceeding 150 deg. Fah., run into moulds, and allowed to cool, when it is quite solid. A liquid form of glucose is also sold. Glucose is largely used as a substitute for malt in the brewing of beer.

Glucose may occasionally be used to adulterate cane sugar, but the expert would have no difficulty in proving the quantity present. However, sugar is now so low-priced it would hardly pay to adulterate it. Moist sugars having very little colour are not necessarily of a superior quality, as they may be made from the lower products of the refiner.

Sweetmeats. — Sugar confectionery as sold in this country is generally wholesome, the ingredients being sugar, gum citric, or tartaric acid, butter, gelatine, albumen, and some innocent flavourings. The colouring matter is, however, not always harmless. Cochineal, saffron, and the colours derived from beetroot and many fruits are not objectionable, but metallic colouring matters are all more or less injurious. The food inspector should look with suspicion on bright opaque colours, especially emerald green. It is stated that what are called "Scotch mixtures" are occasionally adulterated with plaster of Paris or chalk. All injurious foreign substances are readily detected by analysis.

Honey is exuded from the nectaries of flowers, collected by bees, and stored by them in the cells of the comb. It may be removed from the comb without injuring it by means of a special apparatus, but usually the comb is cut and the honey allowed to drain from it. Honey contains about 70 per cent. of glucose sugars, from 5 to 10 per cent. of other sugars, from 17 to 23 per cent. of moisture, and very minute quantities of wax, gum, pollen, and mineral matter. The odour and flavour of honey depend on the blossoms from which it has been collected. When new it is transparent and flows freely, but after a time it crystallises and becomes nearly solid. Thus honey, not removed from the comb when fairly fresh, has to be extracted with heat and pressure. Honey is faintly acid, and undergoes slight fermentation.

The only substances likely to be used as adulterants of honey are cane sugar and glucose. Any amount of the former is easily detected ; but the addition of a small quantity of glucose would be difficult to prove. Water, also, may occasionally be added. Adulteration with starches is not now practised.

CHAPTER XV

CONDIMENTS, SPICES, ETC.

Mustard—Adulterated mustard—Pepper—Adulterated pepper—Cayenne pepper—Ginger—Adulterated ginger—Cinnamon—Adulterated cinnamon—Nutmegs—Adulterated nutmegs—Mace—Cloves—Allspice—Mixed spice—Curry powder—Olive oil—Vinegar—The vinegar plant—Lemon juice and lime juice—Certain foods sold cooked.

Mustard is made from the seeds of black mustard, white mustard, or a mixture of both. The seeds are first finely ground and then sifted two or three times. What passes through is pure flour of mustard. The "dressings" sifted out are subjected to pressure and yield a fixed oil. Mustard, as sold, always contains more or less husk. Both black and white mustard contain about 28 per cent. of myrosin and albumen, 35 per cent. of fixed oil, about 16 per cent. of woody fibre, about 5 per cent. of moisture, and 5 per cent. of ash. Black mustard also contains about 5 per cent. of myronic acid and $3\frac{1}{2}$ per cent. of acrid salt; while white mustard contains no myronic acid and about 11 per cent. of acrid salt. The myronic acid in black mustard exists as myronate of potash, but the acid is converted into the volatile oil of mustard through the agency of myrosin, when the two are brought into contact through the medium of water. The acrid, bitter salt, sulphocyanate

of sinapin, exists in both black and white mustard. The pungency and acidity are due to this volatile oil and bitter salt.

Adulterated Mustard.—It is a question whether the addition of wheat-flour, or some prepared starch, to mustard should be regarded as an adulteration. It is said that without some such addition the whole of the fixed oil cannot be retained, and is absorbed by the papers in which the mustard is packed. Certainly whatever is sold as pure mustard should be simply mustard flour. Mixtures containing wheat-flour or starch should be sold as mixtures. Mustard diluted largely with wheat-flour, or any allied substance, is deficient in pungency and colour, and attempts are made to restore these qualities by the addition of Cayenne pepper, ginger, or ground radish seed, turmeric, gamboge, yellow ochre, or chromate of potash. The ground seed of the common charlock is also used as an adulterant, probably because the husk of the seed resembles very closely the husk of black mustard. The adulterants in use may all be detected by analysis or microscopical examination.

Three or four different qualities of mustard are ordinarily supplied by the manufacturer. When these are all genuine the higher qualities contain larger proportions of black mustard and the lower qualities little or no black mustard.

Pepper.—Black pepper is the dried, immature fruit of the black pepper plant, one of the pepperworts. White pepper is the same, deprived of its outer black husk. Some varieties are, however, always sold as white pepper. To these may be added the long pepper derived from another plant belonging to the pepperworts. It is chiefly used for culinary purposes.

The black pepper plant grows in India and the islands of

Sumatra, Java, Borneo, and the West Indies. It is a climbing plant, which in cultivation attains to a height of from 8 to 12 feet. The peppercorns grow on terminal flower-stalks; they are at first green, then red, and if left un-gathered turn black. When any of the peppercorns on a flower-stalk have begun to turn red, the whole are gathered and dried in the sun. In drying, the outside becomes contracted and wrinkled. The plant begins to produce about the third year, and continues producing for ten or twelve years. Two crops are yielded annually. The best peppercorns are those which are not too small nor too shrivelled; they are heavy, and sink readily in water. There are many commercial varieties of pepper, the names Malabar, Penang Tellicherry, and Sumatra signifying the localities in which they are grown. Ground pepper, as sold, is probably always a mixture of two or more varieties.

The active properties of pepper depend on the presence of a volatile oil, an acrid resin, and a crystalline substance called piperin. The proportion of volatile oil is about $1\frac{1}{2}$ per cent., and the proportion of piperin about 5 per cent. Pepper also contains from about 12 to 18 per cent. of starch and nearly 30 per cent. of woody fibre, about 5 per cent. of ash, a little gum and albumen, and from 9 to 16 per cent. of moisture. Long pepper is not nearly as strong as the other kinds of pepper. It yields less than half the proportion of piperin and about 3 per cent. more ash. The cheaper sorts of pepper are often dirty, mixed with stalks and dust.

Adulterated Pepper.—Pepper is said to be adulterated with wheat, sago, rice, and pea-flour, linseed meal, mustard husk, and a preparation known to the trade as poivrette, which is believed to be ground olive stones. Peppercorns are also liable to an injurious method of adulteration. As

their value depends, among other things, upon their weight, the lighter sorts may be soaked in brine for twenty-four hours, and thus made heavier. It is reported also that peppercorns have been artificially manufactured from oil-cake, pepper dust, clay, etc. Experts are able to detect and estimate the amount of all adulterants.

Cayenne Pepper consists of the pods or seed-vessels of different species of *capsicum* ground to a coarse powder. It is a native of America, but cultivated in India and the West Indies, and (in greenhouses) in European countries. The pods are sold entire under the name of *chillies*, and are used both in the green and in the red state for pickling. They vary much in size and shape, and are termed long-podded, short-podded, and heart-shaped. A minute portion of Cayenne pepper, if heated strongly, volatilises an acrid vapour, causing intense irritation to the throat and eyes; thus, any particles in a sample suspected of being some added foreign substance might be carefully separated and tested by heat. If they did not give off an acrid vapour they could not be Cayenne. The vapour appears to be due to a crystalline substance which has been called capsaicin. Besides about 2 or 3 per cent. of acrid oil, Cayenne contains starchy matter, albuminous matter, gum, wax, woody fibre, 10 to 13 per cent. of moisture, and about 6 per cent. of ash.

Cayenne pepper is rarely adulterated. In the past, starches, brick-dust, and metallic red colours are said to have been added.

The chief spices ordinarily sold in this country are ginger, cinnamon, nutmeg, mace, cloves, and allspice.

Ginger is the root, or rhizome, of the ginger plant, which grows in many tropical countries. It is dug up when the plant is about a year old, and washed; what is called white

ginger is also scraped. Ginger of good quality should have no outer coat; it should be plump, of a whitish or faint straw colour, soft in texture, with a short fracture showing a reddish ring round the outside; the taste should be hot and aromatic.

The taste and aroma of ginger appear to be due to a volatile oil and soft resin. Ginger also contains gum, starch, woody fibre, and some undetermined ingredients. It has about 12 per cent. of moisture.

Adulterated Ginger.—Ginger may be rubbed over with lime to improve its colour, or washed in chalk and water, or exposed to the fumes of sulphur, or bleached with chloride of lime. As the object of such whitewashing is to give an inferior ginger the appearance of better descriptions, it is a form of adulteration. Ground ginger is often adulterated with wheat-flour, ground rice, or some kind of prepared starch; and when much is added the loss of strength and colour may be masked by the admixture of small quantities of mustard husks and turmeric. All the adulterations named are easily detected.

Cinnamon is the bark of a tree belonging to the laurel family, which is chiefly cultivated in Ceylon. Branches about three years old (from half an inch to two or three inches in diameter) are selected and cut off. Two or more cuts are then made lengthwise, and the bark gently lifted with a peeling knife. In twenty-four hours the outer skin of the bark and the pulpy matter are scraped off. The smaller quills are introduced into the larger ones, and the bark is dried in the sun. Cinnamon has a sweet taste and an aromatic flavour. It is light brown in colour, well curled, and scarcely thicker than drawing paper. It breaks with an uneven, fibrous margin. It contains a volatile oil, tannin, mucilage, colouring matter,

resin, an acrid principle, woody fibre, starch, and a little moisture.

Cassia, the bark of another tree belonging to the laurel family, is sometimes substituted for cinnamon. Cassia bark is brown, much stouter than cinnamon, and breaks short off, without splintering. Cassia is also redder in colour and stronger in taste, but less sweet.

Adulterated Cinnamon.—Ground cassia may be substituted for ground cinnamon, or mixed with it. Wheat-flour or some prepared starch has also been used to adulterate cinnamon, the flour or starch being first browned by baking. Bark from which the cinnamon oil has been removed may also be ground and used for mixing. The expert finds no difficulty in detecting any of these frauds.

Nutmegs are the seeds of three species of the *myristica*, a tree said to resemble a pear tree. In the Banda Islands three crops are obtained yearly. The fruit of the nutmeg tree is about as big as a peach; outside is a fleshy covering, next the *mace*, which, when recently gathered, is of a bright scarlet colour, and inside this the nutmeg in its hard smooth shell. After the shell is broken the nutmeg is found to be closely invested with a thin coat, sending off prolongations which enter the substance of the seed, giving it the characteristic mottled appearance. There are two kinds of nutmeg known to trade—the true, round, or female nutmeg, and the inferior description, called the false, long, or male nutmeg.

After the fruit is gathered the mace is separated, and the nutmegs dried in their shells, on hurdles, over a slow wood fire. The drying takes about two months. Sometimes they are first dried in the sun for a few days. When the drying is complete the nuts rattle in their shells, and these

are cracked. On account of their liability to the attacks of the "nutmeg insect," the nuts are frequently rubbed with lime or dipped in a mixture of lime and water. This is considered to injure their flavour, and brown unlimed nutmegs are preferred.

Nutmegs contain a considerable proportion of volatile oil (about 6 per cent.), besides about 30 per cent. of fat and 54 per cent. of woody fibre. There are present also small quantities of starch, gum, and acid.

Adulterated Nutmegs.—As nutmegs are never sold ground they are not as liable to adulteration as powdered spices. However, the following frauds are practised, which are practically adulterations. Nutmegs are deprived of a portion of their essential oil by distillation and sold as entire nutmegs. Good long nutmegs are mixed with wild long nutmegs having scarcely any flavour or odour. Nutmegs riddled by insects are "stopped" and mixed with sound nutmegs; or the thick paste used for stopping, made of flour, oil, and nutmeg powder, has been moulded into false nutmegs. Damaged or shrivelled and refuse nutmegs have been ground and moulded with clay into false nutmegs. An analyst will be able to prove the abstraction of the volatile oil. The size and form of the wild nutmeg will serve to distinguish it from the cultivated kinds. Stopped nutmegs or false ones may be discovered by soaking them in water. The story that wooden nutmegs are manufactured in America may be true; that they are imported to this country is doubtful.

Mace, as already described, forms when recent a bright scarlet coat, enveloping the hard shell of the nutmeg. It is cured by drying. There are two kinds of mace, corresponding to the two kinds of nutmeg, the produce of the same plants. The inferior kind is darker in colour and deficient

in flavour and aroma. The composition of mace closely resembles that of nutmeg.

Mace, like nutmeg, may be deprived of its essential oil by distillation, and may be mixed with wild mace.

Cloves are the unexpanded flower-buds of a tree, belonging to the myrtle tribe, from 15 ft. to 30 ft. in height. The flower-buds are arranged on terminal flower-stalks. They are gathered and dried in the sun or by a fire. Cloves contain about 20 per cent. of volatile oil, 6 per cent. of resin, 13 per cent. of gum, 13 per cent. of tannin, etc., 28 per cent. of woody fibre, and 18 per cent. of moisture. The volatile oil is composed of two oils—the light oil of cloves and the heavy oil of cloves.

The fruit called “mother cloves,” shaped like olives, but smaller, are occasionally met with. They have the odour and taste of cloves in a mild degree.

The quality of cloves may be impaired in two ways—by abstracting from them a portion of their volatile oil, and by placing them in damp places where they absorb moisture and increase in weight.

Allspice, sometimes called pimento, is the fruit of a beautiful tree belonging to the myrtles, growing to a height of nearly 30 ft. It is imported from the West Indies. It is gathered while yet green, and sun-dried or kiln-dried. When dried the fruit is reddish brown. The essential oil is a mixture of a light and heavy oil, and has the characteristic smell of allspice; the yield is about 4 or 5 per cent. It also contains starch, resinous and gummy matter, an astringent extract, colouring matter, sugar, etc., woody fibre, and very little moisture.

Allspice is divided into husk and seed. The husk is soft and brittle when dried, and holds its seeds in two compartments.

Though allspice is sold ground, it appears to be too cheap to tempt the adulterator. The only adulteration ordinarily referred to is the addition of mustard husk.

Mixed Spice.—What is sold under this name is a mixture of various spices ground. It is usually composed of ginger, cinnamon or cassia, and allspice, with sometimes a small quantity of powdered cloves. Whatever the constituents or proportions it should contain nothing but spice. It is, however, frequently adulterated with wheat-flour and ground rice and similar substances.

Curry Powder is ordinarily a mixture of turmeric, black pepper, coriander seeds, cayenne, cardamoms, cumin, fenugreek, ginger, allspice, and cloves. Turmeric, the ingredient furnishing the colouring matter, forms the largest proportion. There is only a small quantity of cayenne, cardamoms, cumin, and fenugreek. Ginger, allspice, and cloves are often omitted. Turmeric powder is obtained from the *Curcuma longa*. The ground tumors of the plant are dried and ground to flour. It is said to be adulterated with alkali to heighten the colour, and with yellow ochre. The fruit of the coriander is round, and nearly as large as white pepper. It contains two brown-coloured hemispherical seeds, having an aromatic taste and odour. The seed-vessels, or pods, of cardamom are of triangular form, each containing several hard, reddish-brown seeds, having a pungent taste, and popularly known as “grains of paradise.” Cumin and fenugreek seeds are aromatic seeds having a peculiar medicinal taste and odour. The characteristic flavour of curry is due largely to the cumin it contains. Curry has been found to be adulterated with ground rice, potato starch, common salt, red lead, and ferruginous earths.

Olive Oil is expressed from olives, the fruit of a well-known tree cultivated in many European countries. Olives should

furnish from 20 to 25 per cent. of their weight of oil, but the whole yield is not usually of the same quality. The pure oil is pale yellow, transparent, of agreeable odour and bland taste. It keeps well, being little liable to become rancid.

Olive oil is not infrequently adulterated with cotton-seed oil, rape oil, and other cheap vegetable oils. Taking the specific gravity is often sufficient to show there is an adulterant present and to warrant the food inspector in sending a sample to an expert. The specific gravity of olive oil is 917.6 at 59 deg. Fah.

Vinegar.—Commercial vinegar is a more or less impure acetic acid. Besides acetic acid it usually contains some alcohol, acetic ether, sugar, gum, various salts, etc., its composition depending to some extent on the substances from which it has been produced.

The different varieties of vinegar, according to their source, are malt, wine, cider, beet, sugar, and wood vinegars. Acetic acid is the volatile principle in all, to the presence of which vinegar mainly owes its aroma and pungency. It may be generated by the fermentation¹ of many vegetable and some animal substances. Any vegetable infusion capable of yielding alcohol will furnish vinegar. In most cases, when vinegar is made on a large scale, the alcoholic

¹ Fermentation by oxidation can only be set up by organisms in the presence of a free supply of oxygen, and the process appears to be due to special organisms which, attacking the substance to be fermented, remove some of its constituents, and set free others, which are at once seized upon by the oxygen of the air. Pasteur pointed out that mycoderms known as "flower of wine," "flower of vinegar," etc., were able to produce different forms of fermentation according to the presence of but little oxygen, or abundance of it. *Mycoderma aceti*, for instance, bring about the splitting up of sugar into alcohol, *i.e.* set up alcoholic fermentation when there is too little oxygen present, but in presence of plenty of oxygen give rise to the formation of acetic acid, *i.e.* set up acetic fermentation.

fermentation precedes the acetous, the vinegar being formed entirely at the expense of the alcohol. A condition essential to acetification is the presence of atmospheric air or oxygen. Two other conditions which greatly facilitate acetification are the presence of a ferment, and an increased temperature.

The great majority of commercial vinegars in this country are derived from the acetous fermentation of a wort made from mixtures of malt and barley or other grain. Malt vinegar is brown in colour, and has a specific gravity of 1017 deg. to 1018 deg. It is made of several strengths, the strongest containing about $4\frac{1}{2}$ per cent. of acetic acid.

In France and other Continental countries vinegar is prepared from grape juice and inferior new wine. The product is white or red, according to the colour of the wine from which it is prepared. That made from white wine is most esteemed. All wine vinegar has an alcoholic odour. The specific gravity is from 1014 deg. to 1022 deg. Wine vinegar is often flavoured by the addition of a little wine.

Vinegar is occasionally made from other substances besides those named, as beer, pears, gooseberries, currants, and other fruit, and even seaweed.

A pure and wholesome vinegar may be prepared from a mixture of sugar and water, or treacle and water, fermented by the agency of a fungus called the **vinegar plant**. Legally vinegar is not allowed to contain more than one-thousandth part of its weight of pure sulphuric acid.

Adulterated Vinegar.—The principal adulterants of vinegar are water, sulphuric acid, and burnt sugar, and sometimes chillies, grains of paradise, and pyroligneous acid, etc. All these are easily detected, except the addition of water, which is difficult to prove, as each manufacturer makes four or five different strengths of vinegar. A rough

test is afforded by the specific gravity—anything below 1014 deg. points to watering.

Vinegar is not infrequently contaminated with arsenic, this being introduced through sulphuric acid used in its adulteration. It may contain traces of copper, lead, zinc, or tin from the solvent action of the acid on metallic surfaces from which it has been in contact.

Lemon juice and Lime juice are expressed from the fruit when ripe or nearly ripe. They contain about 32 grains of citric acid per ounce, a little malic acid, sugar, vegetable albumen, and mucus. It is largely prepared in Sicily and the West Indies. As found in commerce, it is frequently mixed with varying proportions of spirit to make it keep better, but it may be obtained pure. Sometimes olive oil is poured on the top to exclude the air. Good lime juice or lemon juice is free from turbidity or stringiness, keeps well, has a pleasant acid taste, but is not bitter. It should not contain more than 5 per cent of alcohol.

It is adulterated with water, tartaric acid, sulphuric acid, or other acid. Artificial lemon juice, made from citric acid, water, and essence of lemons, may be substituted for the genuine article. It is, however, deficient in flavour, and the fraud can be detected by evaporation.

Foods sold Cooked.—Many of the articles of food already referred to come under this description, as bread, tinned milk, preserved fruit, etc.; yet it appears desirable to draw the food inspector's special attention to some of the victuals for sale in poor neighbourhoods.

Biscuits, Cakes, Pastry, etc.—At the cheap pastry-cooks, and at little shops frequented by children, are sold biscuits damaged with damp and attacked with mould, cakes and pastry originally made with butter beginning to be rancid, and stale beyond all possibility of wholesomeness.

Then what are the contents of the penny meat pies in such shops? They are usually so highly seasoned with pepper that it is impossible to judge by the taste. A few purchases by intelligent inspectors might be the means of improving the quality and wholesomeness of what may be called the dainties of the poor.

Coffee and Bread-and-butter.—There are many shops and stalls where working men are provided with early breakfast, and in which the staple of the business is coffee and bread-and-butter. This is what the customer asks for, and what he probably seldom gets. Why should the grocer be so frequently prosecuted for selling chicory for coffee, and the coffee-shop keeper escape? Why should the butterman be so frequently prosecuted for selling margarine as butter, and the vendor of slices of bread and margarine escape? The difficulty of proving an offence against a coffee-shop keeper or stall-keeper is not insurmountable.

Polonies, Black-puddings, Brawn, etc., have a large sale among the poor. Undoubtedly cheap cooked sausages are not infrequently made with horseflesh or adulterated with it. Indeed, there is a distinct advantage in using horseflesh, as it is firmer and keeps better. Such sausages are commonly made and cooked on the premises where they are sold, and those imported and sold as "small Germans" are not above suspicion. They are also more liable than uncooked sausages to contain diseased meat. Black-puddings are made from pig's blood and fat, with herbs and spice. They are ordinarily genuine, but are often prepared in close little living-rooms. Collared brawn is supposed to be potted pig's head, and may contain portions of tongue and beef, to which there is no objection. However, objectionable offal is sometimes added, and the best brawn is liable to be injured by the sun from exposure in a window. Spiced

balls, otherwise known as "savoury ducks," are a favourite delicacy with the poor. They are supposed to be made from pig's lungs, but "lights" from sheep and oxen are doubtless also used, to which there is no objection. There is reason, however, to believe that "graped" lungs find their way into the food market in this form. Boiled cow's udder is usually sold cold in slices, with or without vinegar. Udders more or less inflamed, or even containing abscesses, may thus be got rid of. Boiled tripe, too, though generally of good quality, may be the subject of inflammation, as is often indicated by its dark colour.

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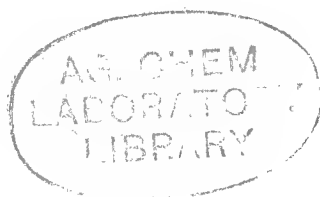
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